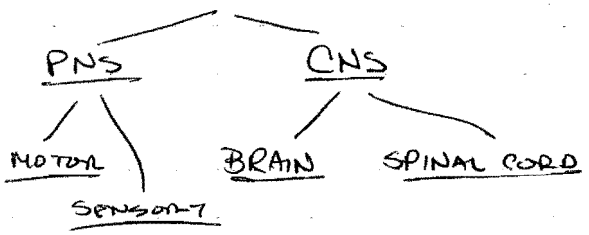
1977

EMT LESSON PLAN

THE NERVOUS SYSTEM

STRUCTURAL BREAKDOWN



- 3 READILY IDENTIFIABLE PARTS OF BRAIN: CEREBRUM (CORTEX OUTER PART), CEREBELLUM, MEDULLA OBLONGATA. CENTER IS MIDBRAIN + BRAINSTEM (NOT VISIBLE) PONS MEDULLA THALAMUS HYPOTHALAMUS
- DESCRIBE FUNCTIONS OF EACH PART BRIEFLY
- CNS SURROUNDED BY MENINGES: DURA, ARACHNOID, PIA
- BLOOD/BRAIN BARRIER
- SENSORY PARTS OF ~~BRAIN~~ NOSE + EYES PART OF CNS; NOTE CONTINUITY OF MENINGES, PROBLEM OF ~~SPRE~~ EASY SPREAD OF INFECTION VIA CSF.

- COMPOSED OF NEURONS AND GLIAL CELLS ("GLUE")
- NEURON PROCESSES FORM NERVES; BODIES FORM GANGLIA (PNS) OR NUCLEI (OR MANY OTHER TERMS, CNS)
- O_2 AND GLUCOSE REQUIREMENTS: CNS ~~TISSUE~~ CANNOT USE FATS, ONLY GLUCOSE, AND CNS HAS LIMITED GLUCOSE STORES. Ø PERFUSION FOR 4-10 MIN ⇒ BRAIN DEATH.
- BRAIN SURROUNDED BY CRANIUM; ~~[redacted]~~ IT IS NOT EXPANDABLE.
- BRAIN CUSHIONED BY CSF. SECRETED AS A SPECIAL FILTRATE OF BLOOD INTO THE VENTRICLES (HOLES IN BRAIN). EVENTUALLY GOES BACK INTO BLOOD INTO VENOUS SINUS THROUGH ARACHNOID VILLI IN MID-SAGITTAL SINUS
- CNS NEURONS CANNOT REGENERATE (EXCEPT, NOT ESSENTIAL RARELY, THOSE IN SPINAL CORD.)
- BUT, PNS NERVES CAN REGENERATE (WHY? PROCESSES OF NEURONS, NOT BODIES)
- OPENINGS IN SKULL:

  ~~SEE~~

  TENTORIUM SUPPORTS CEREBRUM

  INCISURA TENTORII IS NOTCH THROUGH WHICH MID-BRAIN GOES

  FORAMEN MAGNUM: HOLE IN BASE FOR SPINAL CORD.
- CRANIAL NERVES

SPINAL CORD + PNS
- TRACTS OF NERVES FROM BRAIN
- PART OF CNS: STILL MENINGES
- SPINAL NERVES: NOMENCLATURE
- BRACHIAL + SACRAL PLEXUS (AND SIMILAR ARRANGEMENTS)
- "SWITCHING OVER" FROM (C) TO (R) AT VARIOUS LEVELS IN CNS. THUS INJ. AT DIFF. LEVELS PRODUCE DIFF. LATERALIZING SIGNS
- PHYLOGENIC N. ORIGIN.
- REFLEX ARCS

FUNCTIONAL NS
- FUNCTIONS OF SYMPATHETIC + PARASYMPATHETIC N.S.
- SYMPATHETIC NERVE TRUNK

SOMATIC
VISCERAL/AUTONOMIC
SYMP
PARA

INJURIES
1. ~~HEAD~~ SKULL INJURIES (MORE ON THIS NEXT TIME)
- ~~SKULL CONSISTS OF~~
- CRANIAL BONES ARTICULATE IN SUTURES; SOFT FONTANELLES IN INFANTS.
- OPEN VS. CLOSED INJ. (WHICH IS MORE DANGEROUS? WHY? CLOSED; NOWHERE FOR PRESSURE TO GO)
- SIS OF FX:
  - DILATED PUPILS (WHY? CRANIAL N.)
  - BLOOD OR CSF (STOP CSF FLOW? WHY? NO, CAN BE REPLACED EASILY, NOT ESSENTIAL; PROVIDES OUTLET FOR ↑ ICP.
  - "BATTLE'S SIGN": BRUISING OVER MASTOID
  - "BLACK EYES"
  - LOOSE MAXILLA
  - "BLOW-OUT" FX OF ORBIT
- THINK C-SPINE INJURY!
- DON'T CLEAN IN FIELD
- ~~FACE~~ SOFT T. INJ.: BLUNT OR SHARP

SKULL
CRANIUM
FACE
MAXILLA
MANDIBLE
OTHER

FX. LINEAR
COMMINUTED
DEPRESSED
BASAL
FACIAL

2. BRAIN INJURIES

- CONCUSSION
- CONTUSION
- LACERATION
- HEMATOMA
  - EPIDURAL
  - SUBDURAL
  - SUB-ARACHNOID (INTRACEREBRAL)

TYPES

- CONCUSSION: BRIEF NEUROLOGIC DEFICIT, NO SEQUELAE.
- CONTUSION: DIFFUSE BLEEDING + SWELLING
- EPIDURAL H.: USUAL MIDDLE MENINGEAL ARTERY, FAST. TRANSTENTORIAL HERNIATION ⇒ III N
- SUBDURAL: SLOW, VENOUS BLEEDING. DELAYED DEFICIT.
- HEAD AND BRAIN INJ. DON'T CAUSE SHOCK!

S+S OF BRAIN INJ.

↓ LOC

↑ ICP ⇒ CUSHING'S TRIAD: ↑R ↑BP ↓P

- ↑T
- ↑↓ PULSE PRESSURE (WIDENS)
- Δ PERSONALITY
- ↓ COORDINATION
- LOSS OF TONUS, SPHINCTERS
- HEMIPARESIS
- DILATION OF 1 OR BOTH PUPILS
- ABBORRANT RESP. PATTERNS
- POSTURE / RESPONSE
- VOMITING (PROLONGED, PROJECTILE)
- CONSTRICTED

- WHY PARALYSIS + PUPIL DILATION? HERNIATION THROUGH ~~OPTIC~~ INCISURA TENTORII OF PART OF THE BRAIN
- EXAMPLE OF TRAUMA VICTIM W/ "LUCID INTERVAL"

1. UNCONSCIOUS ⇒ CONSCIOUS
2. H/A, ↓ LOC
3. ↑BP, ↓HR, ↑R
4. IPSILATERAL PUPIL DIL, (III N.)
5. CONTRALATERAL WEAKNESS (CEREBRAL PEDUNCLE)
6. BILATERAL DIL. PUPILS, DECEREBRATE POSTURE.
7. PT. ↓

EMERGENCY CARE

ABC
B BLEEDING
C CERVICAL SPINE
D DESCRIPTION

- O_2
- ↓T

- DON'T HYPEREXTEND NECK (EOA GOOD)
- ~~POSITION~~: SIDE, ↑ HEAD
- CSF LEAKS: LET DRAIN. (WHY?) (LOOSE STERILE DRESSING) BUT CONTROL BLEEDING.
- DIRECT PRESSURE? (WHY OR WHY NOT?) FINGERTIP PRESSURE, REFLECTION OF GALEA
- CERVICAL SPINE
- NEURO WATCH
- DON'T REMOVE IMPALED OBJECTS (WHY?)
- ~~DIRECT PRESSURE~~
- HYPERCARBIA ⇒ VASODILATION ⇒ ↑ICP
- HYPERTHERMIA ⇒ ↑ METABOLISM (10-15%), SO ↓T
- VS + NEURO WATCH

3. CONCUSSION PROCEDURES

- NOTIFY FAMILY
  - A. ✓ LOC, + POLL, WORK 2-3 HRS
  - B. NOTE FOR DANGER SIGNS
    - PERSISTENT OR PROJECTILE VOMITING
    - HEMIPARESIS OR WEAKNESS
    - RESPIRATORY DIFFICULTY
    - SEIZURES
  - POST-CONCUSSION SYNDROME:
    - H/A
    - DIFFICULTY IN CONCENTRATION
    - Δ PERSONALITY
    - FEW DAYS BLURRED VISION

5. NEURO WATCH
6. SPINE INJ.

4. BRAIN DISEASE

H/A
- H/A: TENSION, EYESTRAIN, MUSCLE FATIGUE, MENSTRUAL, SINUS ORIGIN → ASPIRIN

FAINTING
- FAINTING: PSYCHOGENIC SHOCK

SEIZURES/CONVULSIONS
- CONVULSIVE SEIZURES: FROM ↑T IN KIDS, ECLAMPSIA, CVA, INJURY OR INFECTION OF BRAIN, EPILEPSY, IDIOPATHIC
  - TONIC RIGIDITY
  - CLONIC SPASMS, ↓R, CYANOSIS (HYPOXIA)
  - POSTICTAL RELAXATION,
  - EG. ↓ GROUND, BITE STICK IF NECESSARY. POSTICTAL: COMA POS. PULL AWAY SHARP EDGES. DON'T RESTRAIN, OR FORCE BITE STICK

EPILEPSY
- [redacted]
- STATUS EPILEPTICUS SUSTAINED CLONIC ACTIVITY. NEEDS DRUGS, ETC.
- OPEN MOUTH: FINGERS BEHIND JAW.
- EPILEPSY PETIT + GRAND MAL
  - "AURA"

MENINGITIS
ENCEPHALITIS
- INFECTIONS ⇒ MENINGITIS, ENCEPHALITIS
- NUCHAL RIGIDITY (ALSO FROM SUBARACHNOID BLEEDS)

NUCHAL RIGIDITY

POLIOMYELITIS/TICK PARALYSIS/ GUILLIANE-BARRE
- CONTAGIOUS
- POLIOMYELITIS: ASCENDING FLACCID PARALYSIS (LIKE TICK PARALYSIS)

CVA
- CVA: THROMBOSIS, [redacted] HEMORRHAGE, EMBOLISM, VASO-SPASM COMPRESSION OF VESSELS.

- SYS of CVA : SUDDEN
  - H/A
  - COLLAPSE, ↓ LOC
  - HEMI-PARESIS
  - FACIAL HEMI-PARESIS
  - ↓ ORIENTATION
  - APHASIA (BUT MAY HEAR + UNDERSTAND)
  - CHEEK PUFFING
  - ≠ PUPILS
  - RAPID, BOUNDING PULSE
  - DYSPNEA
  - SECRETIONS IN AIRWAY
  - DROOLING

APHASIA

- EQ
  - O_2
  - POSITION
  - ↓ T
  - NPO
  - ↓ ANXIETY

5. NEURO ASSESSMENT

PERL DIRECT/CONSENSUAL

- LOC
- GCS
- EYE: ~~NLRT~~ PERL-A (SHAPE, SIZE, MVT.; DIRECT VS. CONSENSUAL)
  - FROM SIDE: AVOID HEATING REFLEX
  - EOM (EXTRAOCULAR EYE MVT.)
  - (IPSILATERAL SIGNS)
  - ACCOMMODATION (NORM ACCOMODATION)
  - DOLL'S EYE
- MOTOR: FACE: TOOTH, FOREHEAD, EYELIDS, BROW
  - GRIPS & FOOT
  - BABINSKI
- POSTURE: DECORTICATE 4P DECEREBRATE (4P)

BABINSKI

DOCUMENTATION

6. SPINE INJ.

SPINE Fx ≠ CORD INJURY
PARADOXICAL RESPIRATION
1. SPINE
2. RIBS
PINPRICKS
ARMS UP
NEURO SHOCK

- REV. ANATOMY
- SPINE Fx ≠ CORD INJ.
- BOTH MOTOR ROOTS
UNCONSCIOUS PT.:
- PARADOXICAL RESPIRATION
- PIN PRICK UPWARDS
- ARMS ON CHEST OR UP
- NEUROGENIC SHOCK (↓BP ONLY, WHY?)
- ERECTION

7. FACIAL + NECK INJURIES

- BLOOD + CLOTS
- JAW Fx
- NECK FLEXION
- LARYNX OR TRACHEA Fx
} ⇒ AIRWAY

- SOFT TISSUE WOUNDS:
  * COLD FOR CONTUSIONS UP TO 24 HRS
  * STERILE PRESSURE DRESSING FOR OPEN WOUNDS
  * NO ET, STERILE DRESSING FOR EXPOSED TISSUE
  * SAVE AVULSED PIECES. HOW?
- FACE Fx: STANDARD PRINCIPLES APPLY
- NECK LACERATION: DIRECT PRESSURE
  * BRAIN HAS COLLATERAL BLOOD SUPPLY, SO CAN STOP FLOW IN 1 CAROTID
  * AVOID AIR EMBOLISM FROM CUT VEIN
    PRESSURE BOTH SIDES,
    L. SIDE POSITION, HEAD ↓
- TRACHEA INJ.: CALM DOWN PT.

8. EYE:

EMT COURSE
HOMEWORK #5: THE NERVOUS SYSTEM

1. The nervous system may be broken down into parts in two different ways, structural and functional. The two major structural divisions are the central nervous system (CNS) and the _____ nervous system (____). The CNS in turn consists of the _____ and the _____, and the other major part consists of the _____ nerves and the _____ nerves.

2. Two major functional divisions of the nervous system are the voluntary nervous system and the _____ nervous system, which in turn consists of the _____ nervous system (fight or flight; nerve trunk outside but parallel to the spine) and the _____ nervous system (vagal stimulation, Valsalva maneuver).

3. A reflex arc directly connects motor and sensory nerves through the spinal cord, but does not depend on the brain. True or False?

4. The brain and spinal cord are cushioned by a clear fluid called _____ (__ __ __). This fluid is formed from blood (through the blood/brain barrier) by the choroid plexus in the ventricles of the brain. It flows through the CNS, then is reabsorbed by the blood through the arachnoid villi in the midsagittal venous sinus.

5. The fluid described above is not necessary for CNS function, and is easily replaced. True or false?

6. Give two reasons(other than those given above) not to stop the outflow of clear fluid from the nose or ears of the head-injured patient.

7. List, from inside to outside, the meninges.

8. What is nuchal rigidity (a stiff neck, with inability to touch the chin to the chest) often a sign of?

9. Define:
   a. anesthesia
   b. paresthesia
   c. paralysis
   d. paresis
   e. hemi-paresis
   f. ipsilateral
   g. contralateral

10. A person with full nerve function in all extremities does not have an injury to the spine. True or False?

11. A patient presents with labored diaphragmatic breathing (paradoxical respiration). Where is the spine injured?

12. An uncounscious patient has his hands over his head. Although they have been brought back down to his sides, they keep creeping or falling back to a position above his head. Should you backboard him? Why?

13. Describe the difference between the two types of epileptic seizures.

14. List several causes of convulsive seizures.

15. What commonly-known procedures are not appropriate for a person having a seizure?

16. What are the effects of hypoxia and hypercapnia in an alert person?

17. What effect does hypercapnia have on the blood vessels of the brain?

18. Should a patient with a CVA always be given O_2? Why or why not?

19. What is aphasia? Can an aphasic patient ever understand what is being said around him?

20. List several signs and symptoms of increasing intercranial pressure.

21. Except in very rare instances, regeneration of the CNS does not happen. True or False?

22. What is the difference between concussion and cerebral contusion?

23. What is the cause of neurogenic shock?