Intracellular Fluid Volume Excess (Intracellular Edema)

Key : ICFVE chapter

Objectives

At the conclusion of this lecture, you will be able to:

- Discuss the pathophysiology of fluid and ICF Excess (cellular edema)
- Discuss common, and some less common, causes of ICFVE (cellular edema) disturbances
- Discuss the most common clinical presentations of ICFVE (cellular edema)
- Discuss the rationale for certain treatments of ICFVE such as cerebral intracellular edema

Pathophysiology of ICFVE (intracellular volume overload)

ICFVE

- Results from the fluid in the blood vessels being hypotonic and hypoosmolar
- If blood is hypotonic in relation to isotonic cells, then water moves into the cells by osmosis

Pathophysiology of ICFVE (intracellular volume overload)

ICFVE
- "Water intoxication"
- Total body water is excessive ; but total body sodium level is normal

ECFVE
- Water is not moving into the cells.
- Differs in that both sodium and water are moving into tissue space (third space)
  - Process of peripheral edema

Pathophysiology of ICFVE (intracellular volume overload)

- Water intoxication
- Expanded intracellular water volumes results in functional impairment of cells
  - The cells most sensitive to excessive intracellular water volume: cerebral cells

Etiology of ICFVE (intracellular edema)

- Excessive water intake (po or IV)
- Solute deficit
- Excess ADH production
- Renal impairment

Etiology of ICFVE (intracellular edema)

Excessive water intake (po or IV)

- Poor solute ingestion (chronic)
- Psychogenic polydipsia
- Iatrogenic (in-hospital)
  - D_5W ; D_5W 1/2 NS
    - Dextrose is rapidly metabolized
- Solute deficit

Etiology of ICFVE (intracellular edema)

Solute deficit

- Low protein diet
- Plain water enemas

Renal impairment

- Decreased water excretion
- (although, RF, like CHF, and cirrhosis, usually involves more intravascular and interstitial volume excess)

Etiology of ICFVE (intracellular edema)

ADH excess

SIADH (Syndrome of Inappropriate ADH)

- Tumors
  - Brain, lung, pancreas, prostate
- Metabolic
  - Hypothyroidism
- Stress
  - Surgery, anesthesia, pain, head trauma, infection
- Medications
  - narcotics

Pathophysiology of ADH Excess

ADH excess (eventual intracellular edema)

- Occurs in response to stress (trauma, …)
- ADH is also known as ***Vasopressin*** (Pitressin)
  - Has both vasopressor and antidiuretic hormone (ADH) properties
  - Increases water resorption at the distal renal tubular epithelium (ADH effect).
  - Causes smooth muscle contraction in vascular bed (vasopressor or PVR effects)

Clinical Presentation of ICFVE (intracellular edema)

Hx. [those of hypoNatremia]

- Early
  - Headache
  - N, V; weakness
- Moderate
  - Behavioral : anxious, irritable, disoriented
- Late
  - Seizures, coma

Clinical Presentation of ICFVE (intracellular edema)

PE

- VS
  - Elevated BP [Cushing's - like]
  - Bradycardia
  - Respirations: rapid
- GEN: delirium,…
- HEENT: fundi - papilledema
- and any other signs of primary underlying disorder (lung ca.,…)

Volume Overload Treatment of ICFVE (intracellular edema)

Treatment of ICFVE (intracellular edema) similar to Tx of extracellular volume overload

- water removal (after ABCs/O2,Monitor,…)

Tx of Mild (early stage)

- Restrict water [including ice chips]

Tx of Moderate to severe (CNS signs of IICP)

- Osmotic diuretic Mannitol
- Hyperttonic(3%) saline [usu not prehospital]

Summary

We have discussed ICFVE :

- The pathophysiology of IC fluid excess and intracellular edema
- How the Tx of this pathophysiology may be complicated by the primary, underlying disorder (eg lung cancer, trauma,…)
- Common, and some less common, causes
- clinical presentations
- Expected complications and rationale for treatments of ICFVE / intracellular edema