

Near Drowning

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Question # 1

- A 5 year old boy is rescued by lifeguards at the beach after being pulled away from parents by a rip current. He was underwater for approximately 5 minutes. He is intubated by EMS at the scene and brought to your ED. What fluid balance shifts and electrolyte abnormalities do you expect to see in your initial set of labs?

Answer Choices

- A. Increased blood volume, hemodilution, reduced serum electrolytes, and hemolysis
- B. Decreased blood volume, hemoconcentration, and elevated serum electrolytes
- C. Initially reduced serum electrolytes with subsequent hemoconcentration and elevated serum electrolytes after gastric decompression
- D. None of the above, as the child likely did not aspirate sufficient fluid to see change in electrolytes

Answer Choices – Correct Answer

- A. Increased blood volume, hemodilution, reduced serum electrolytes, and hemolysis
- B. Decreased blood volume, hemoconcentration, and elevated serum electrolytes
- C. Initially reduced serum electrolytes with subsequent hemoconcentration and elevated serum electrolytes after gastric decompression
- D. **None of the above, as the child likely did not aspirate sufficient fluid to see change in electrolytes**

Explanation for Question # 1

- The child initially panics, then holds his/her breath and loses consciousness. During this period, the child may lose cough and gag reflexes, then aspirate large amounts of water. Theoretically the type of fluid aspirated will affect the circulatory volume and electrolyte balance. Fresh water is hypotonic and is rapidly absorbed across the alveoli, which may result in increased blood volume, hemodilution, a reduction in serum electrolytes, and hemolysis. On the other hand, a submersion injury in salt water may result in hemoconcentration, decreased blood volume, and an elevation in serum electrolytes.

Explanation continued

- However, for blood volume to be seriously altered, the patient must aspirate at least 11 mL/kg; at least twice this amount must be aspirated to result in marked electrolyte changes.
- Yet most children aspirate less than 4 mL/kg of fluid, which means that, practically speaking, little clinical relevance exists to the type of water in which the child is submerged.
- Most patients who experience near drowning are intravascularly hypovolemic as a result of capillary leak from asphyxia.

Question # 2

- You are evaluating a 4 year old girl who is brought to ED by EMS after a near drowning incident. She was playing in the pool, being watched by older sibling and parents who were outside grilling, when one of her floaties came off. Mom heard patient splashing but by the time she reached her she was face down. When patient arrives to ED, she is awake and speaking. As part of your evaluation, you perform all of the following except:

Answer Choices

- A. Assess ABCs and provide oxygen if any signs of distress – place EKG leads and obtain blood gas
- B. Immobilize C-spine and obtain imaging including chest and spine x-ray and brain CT
- C. Assess rectal temperature and warm patient
- D. Monitor glucose level
- E. Consider nasogastric tube placement for gastric evacuation

Answer Choices – Correct Answer

- A. Assess ABCs and provide oxygen if any signs of distress – place EKG leads and obtain blood gas
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Explanation for Question # 2

- Cohort study published in 2001: Eleven (0.5%) of 2,244 submersion victims in Washington state had C-spine injuries. All 11 had submerged in open bodies of water; had clinical signs of serious injury; and had a history of diving, motorized vehicle crash, or fall from height. No C-spine injuries occurred in 880 low-impact submersions. Submersion victims are at risk for C-spine injury only if they have also sustained a traumatic injury. Routine C-spine immobilization does not appear to be warranted solely on the basis of a history of submersion.

Explanation Continued

- Moreover, brain CT is not indicated unless suspicion for TBI (such as diving injury)
- For children who are spontaneously moving and breathing, close observation and monitoring are required to ensure that response to the submersion injury is not delayed. Children who are well saturated in room air and who have age-appropriate responses and a normal Glasgow coma score may be discharged after 4 to 8 hours; however, those who require significant amounts of oxygen or who have abnormal sensorium need to be admitted to the hospital.

References

- AAP Textbook of Pediatric Care, Chapter 344: Drowning and Near Drowning by Lorry R. Frankel, MD
- Watson RS, Cummings P, Quan L, Bratton S, Weiss NS. Cervical spine injuries among submersion victims. J Trauma. 2001 Oct;51(4):658-62.
- APLS: The Pediatric Emergency Medicine Resource, 4th edition. 2007. Edited by Marianne Gausche-Hill, Susan Fuchs, Loren Yamamoto
- UpToDate

Thanks!

