Hyperosmolar Hyperglycemic State

Hyperosmolar hyperglycemic state, also known as HHS or HHNK, is a state of extreme glucose toxicity. It is characterized by the presence of insulin alongside increased serum osmolality. Other characteristics include blood glucose levels above 600 mg/dL without significant acidosis or ketosis. Clinical features include severe dehydration, altered neurological status, tachycardia and hypotension. Management includes IV fluids, insulin, and the treatment of the underlying disorder.



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Characteristics

Insulin Present
Insect-syringe
In HHS, insulin is present which prevents lipolysis and ketogenesis. Lipolysis is the breakdown of fat which produces acid as a byproduct. Ketogenesis is the breakdown of fatty acids which produces ketones as a byproduct.

Increased Serum Osmolality
Thick as Mud
Serum osmolality is increased due to hyperglycemia induced polyuria leading to a state of severe dehydration. This state of severe dehydration leads to the symptoms of HHS.

Glucose >600 mg/dL
Hiker-glue-bottle 6-sax
Patients with hyperosmolar hyperglycemic state may have glucose levels of 600mg/dl or more. This severe glucose level leads to glucose toxicity and has a large osmotic effect. Patients have pronounced glucosuria as well, which leads to polyuria.

No Significant Acidosis or Ketosis
Police Blocking Acidic-lemon and Keys
Lipolysis and ketogenesis does not occur in HHS, so acidosis and ketones are not present.

Clinical Features

Severe Dehydration
Dehydrated David
Patients present with a dry parched mouth and extreme thirst due to polyuria, a symptom of hyperglycemia.

Altered Neurological Status
Nervous Party Man with Delta-halos
Hyperosmolar hyperglycemic state may induce confusion, weakness, trouble talking, seizures, hallucinations, coma, or signs and symptoms that mimic a stroke.

Tachycardia and Hypotension
Tack-heart-card and Hippo-BP
Tachycardia and hypotension occur as a compensatory mechanism to the decreased blood volume and cardiac output. This decrease in body fluid is due to the polyuria and excessive dehydration of HHS.

Management

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IV Fluids

IV Fluid

Rehydrate patients slowly to prevent cerebral edema. Be cautious when rehydrating the elderly, CHF patients, and renal disease patients.

Insulin

Insect-syringes

Patients in HHS aren't producing enough insulin to counteract the hyperglycemia, so insulin must be administered.

Treat Underlying Disorder

Treat-pill Underlying-roots

Treat the underlying cause of HHS. Possible precipitating factors of HHS include burns, severe diarrhea, medications, uncontrolled diabetes, or myocardial infarction.

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