

Location: Emergency Room

Vitals: BP: 102/68 in both arms , HR: 110/min regular rhythm , RR:16/minute , Afebrile

C.C:

A 75 yr old nursing home patient with decreased urine out put and altered mental status.

HPI:

A 75-year-old Nursing home patient is brought to ER for one day of altered mental status and decreased urine output. The patient is unable to give any history. The nursing home staff says that he has been having watery stools for the last 4 days. He has 7-10 loose bowel movements per day. Stools have no foul smell, no mucous or blood. He has been drinking fruit juices and oral formula for the last 3 days, but has not urinated in the last 12 hours. They denied any history of fever, chills, chest pain, shortness of breath and abdominal pain.

PMH:

His past medical history is significant for type II DM, hypertension and osteoarthritis.

SH:

The patient does not smoke or drink alcohol.

FH:

Father died at the age of 90 with Alzheimer's disease and mother died in motor vehicle accident. One brother has diabetes.

Medications:

Current medications are lisinopril 5mg once daily, NPH insulin 10 U in the morning and 15 U in the evening, metoprolol, simvastatin, aspirin, ibuprofen and multi vitamins. His vaccinations are up-to-date.

All: Iodine and shellfish.

How would you approach this case?

Based on the history you may consider decreased urine output secondary to acute renal failure. Also consider dehydration leading to acute prerenal failure, diabetes causing possible intrinsic renal cause (DM), and post-renal obstruction (BPH). The other possible causes of altered mental status in this patient include DKA, hypoglycemia, hypertensive crisis, stroke etc.

Order:

Complete physical examination

Results of the physical examination:

HEENT: PEARL, EOM intact, mucosa is dry, no JVD and moderately dehydrated.

Heart and lungs are normal to auscultate.

Abdomen: Scaphoid, soft, non tender, BS are hyperactive, no organomegaly

Rectal: Prostate is normal in size, sphincter tone normal, no gross blood, and no masses.

CNS: Patient is not alert and not oriented to time, place or person. Otherwise there are no focal sensory or motor deficits.

Extremities: There is no edema, cyanosis or clubbing.

Skin is dry with poor turgor, no rash, petechiae or bruises.

Now how would you approach this patient?

This patient is dehydrated, so the primary things to order are:

- Pulse oxy, stat

- STAT IV Access
- STAT NS fluid bolus followed by continuous drip
- STAT Foley catheter, you are not sure of bladder residual volume in this elderly patient
- 12 lead EKG, stat
- ABG, stat
- CBC with differential, stat
- Mg and Phosphate, stat
- BMP (Na, K, Chloride, HCO₃, BUN, Cr, Blood sugar, and Ca) stat and Q 8 hrs
- Urine analysis, stat
- Urine culture and sensitivity, stat
- Urine sodium and creatinine, stat

The Foley is placed; 30 ml of residual volume is noted. NSS IV fluid is running. What do you do now?

Your initial assessment of the patient

1) What is the hemodynamic status?

Dehydrated patient should be hydrated. A volume overloaded patient should be given diuretics. CVP (central venous pressure should be recorded by placing an order for central venous line in unstable patients)

2) What is the type of renal failure?

Prerenal, renal or post renal - will decide the main mode of treatment.

3) Is there a need for urgent hemodialysis?

The indications for urgent hemodialysis are refractory acidosis, refractory electrolyte disturbances, intoxicants, volume overload (pulmonary edema), pericardial rub, uremic encephalopathy, bleeding tendencies, and arrhythmias.

4) What is the most likely etiology?

Labs reveal a BUN of 90, creatinine of 2.3, potassium of 5.6 and mild proteinuria. So how would you proceed?

- If the BUN (Normal is 7-20) and creatinine (0.6 to 1.2) is elevated, then the diagnosis of renal failure is confirmed. Check the electrolytes that are part of the BMP. If the potassium level is elevated (normal is 3.5 to 5) then give D5/Insulin and re-check the potassium level. If the potassium is high always get the EKG. If the potassium is low, then replace the potassium cautiously and recheck the level.
- If the patient is taking nephrotoxic drugs like NSAIDs, stop the drugs immediately. Ibuprofen is an NSAID and it aggravates the renal failure. ACEIs are indicated in DM type 2 for their renal protective effect, but in established renal failure with a creatinine of more than 2.0 to 2.5 their use should be restricted.
- Now it's the time to determine the cause of the renal failure. 1st determine whether the cause is low renal perfusion (prerenal) (or) disorders of parenchyma (renal) (or) obstructed urine flow (post renal).

- There are 3 ways to differentiate prerenal from renal causes. The best way of assessing is by calculating $F_{\text{E}Na}$ (Fractional Excretion of Sodium).

Prerenal:

- $F_{\text{E}Na} < 1$
- Spot urine sodium < 20 meq/L
- Disproportionate increase of BUN/Cr ratio $> 20:1$

Renal:

- $F_{\text{E}Na} > 1$
- Spot urine sodium > 20 meq/L
- Proportionate increase of BUN/Cr ratio $< 20:1$

A short explanation to understand the causes:

- Prerenal azotemia can lead to ATN, which is the most common cause of the acute renal failure. Two basic mechanisms:
 - a) Decreased effective intravascular volume (includes third space loss)
 - b) Decreased cardiac output.
- Renal causes have specific etiologies ranging from infectious to toxin mediated and can be treated with specific etiology directed therapy.
- Post renal or obstructive must be promptly treated to avoid any damage to the kidney. Two most common are BPH and nephrolithiasis.
- Here the case scenario is of a pre renal failure most probably due to dehydration resulting from diarrhea.

Order routine:

- Discontinue lisinopril
- Discontinue ibuprofen
- Continue rest of his current medications
- Transfer to the floor/ward
- Vitals q2h
- 24hr urine protein
- Diabetic and renal diet with 100% hand assistance (Only if the patient is awake)
- Complete bed rest until his mental status returns to baseline

- Heparin 5000 U SQ Q12 hrs to prevent DVT
- Renal ultrasound, routine. Stat order is placed only if you suspect an infective/renal/obstructive cause.
- Daily weights
- Strict input and output
- Acu checks (blood sugar), QID (4 times a day)
- HBA1C levels, routine
- Sliding scale insulin

Finally treatment:

- In prerenal the goal of the treatment is to increase the renal blood flow. If the patient is dehydrated continue I.V hydration. If the patient does not respond to fluids, start Lasix (furosemide) to increase the urine output. If the cause of the renal hypoperfusion is heart failure you can start dobutamine and dopamine.
- The use of sodium bicarbonate (type NaHCO_3) is rarely needed unless the patient is in severe acidosis i.e. pH of <7.2 .

Review orders:

Once the patient's mental status is improved

- Discontinue (D/C) bed rest
- Out of bed to chair
- D/C Foley catheter
- Continue renal diet
- Plenty of oral fluids

Other considerations:

- Pericardial rub or rales - Chest X- ray (Both PA and lateral view)
- Fever - Blood cultures, Immediate renal ultrasound, urine culture and start antibiotics (Ciprofloxacin)
- Treat hypertension
- Obstruction - order urology consult. Before getting a consult please order urgent renal ultrasound and don't forget to catheterize.
- Patient may take days to weeks to recover
- Recovery diuresis should be treated with half (0.45%) NS and frequent electrolyte monitoring.

Primary diagnosis:

Acute renal failure or prerenal azotemia

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