

UROLOGY

Renal Failure

Uremia is a syndrome of clinical and metabolic abnormalities associated with fluid, electrolyte, and hormone imbalances, which develop in parallel with deterioration of renal function. The term uremia literally means urine in the blood. In general, uremia is associated with chronic renal failure (CRF), but it also may occur with acute renal failure (ARF) if loss of renal function is rapid.

Azotemia is elevation of the blood urea nitrogen (BUN) (reference range = 8-20 mg/dL) and serum creatinine (normal value = 0.7-1.4 mg/dL) levels.

Average GFR is about 125 mL/min (10% less for women) or 180 L/d. About 99% of this is reabsorbed (178 L/d), the rest (2 L/d) is excreted as urine.

Pathophysiology: Normally, the kidney is the site of hormone production and secretion, acid-base metabolism and regulation, fluid and electrolyte regulation, and waste-product elimination. In the presence of renal failure, these functions are not performed adequately and metabolic abnormalities, such as anemia, acidemia, hyperkalemia, hyperparathyroidism, malnutrition, and hypertension, occur.

Clinical Presentation: Uremia can occur once the creatinine clearance is below 10-20 mL/min. The rise of serum creatinine may not be evident before 50% of the GFR is lost.

Nausea, vomiting, fatigue, anorexia, weight loss, muscle cramps, pruritus, mental status changes, visual disturbances, and increased thirst. Uremic encephalopathy can progress to seizures, coma, and death.

Metabolic abnormalities such as anemia, acidemia, and electrolyte abnormalities are prominent, hypertension is common. Diabetic patients may appear to be in better control but may tend to have more hypoglycemic episodes as renal function declines. This paradoxical improvement in glycemic control is a result of increased insulin sensitivity and insulin half-life.

The skin is classically earthy color. Uremic pericarditis can be associated with a pericardial rub or a pericardial effusion. Pulmonary edema and Plural rubs occur. Occult GI bleeding may occur. Uremic fetor (ammonia or urinelike odor to the breath) also may be present. Nail atrophy are common.

Lab Studies:

- Elevated serum urea and creatinine
- Hyperkalemia, low serum bicarbonate, hypocalcemia, hyperphosphatemia, hyponatremia (in ESRD with free-water excess)
- Hypoalbuminemia in patients who are nephrotic and/or malnourished
- Normochromic normocytic anemia - Other underlying causes of anemia should be ruled out.
- Urinalysis - Dipstick proteinuria may suggest glomerular or a tubulointerstitial problem

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Imaging Studies: to diagnose the cause of renal failure.

▪ KUB, U/S and Doppler, IVU, CT-Scan, MRI, Renal angiography, Radionuclide study, and Renal Biopsy

Acute renal failure (ARF)

Is defined as an abrupt or rapid decline in renal function. A rise in serum blood urea nitrogen (BUN) or serum creatinine concentrations, with or without a decrement in urine output. The condition often is transient and completely reversible.

Causes: The causes of ARF traditionally are divided into 3 main categories: prerenal, intrarenal, and postrenal.

Prerenal ARF, the perfusion of the kidneys is compromised by:

1. Hypotension and hypovolemia due to vomiting, diarrhea, pancreatitis, burns, or sweating) may be present.
2. Heart Failure
3. Patients may have intense vasoconstriction due to hypercalcemia, prostaglandin inhibition (eg, due to nonsteroidal anti-inflammatory drugs [NSAIDs]), cyclosporine, ACE inhibition,

intrarenal (Parenchymal) ARF.

- Nonspecific (acute tubular necrosis and acute cortical necrosis)
- Specific (GN., interstitial nephritis, Toxin, dye induced and haemolytic uremic syndrome)

Postrenal causes are as follows:

- The obstruction must be
 - distal to the bladder
 - or bilateral to cause ARF
 - Unilateral if only a single kidney is functioning properly

The most common cause is secondary to BOO due to BPH or a urethral stricture

Urine output findings can be misleading.

Renal ultrasound is a quick and noninvasive study that can help detect obstruction.

Classifying ARF as oliguric or nonoliguric based on daily urine excretion may be useful. Oliguria is defined as a daily urine volume of less than 400 mL/d. Anuria is defined as a urine output of less than 50 mL/d and, if abrupt in onset, is suggestive of obstruction.

Treatment of ARF

intensive care unit (ICU), Maintenance of volume homeostasis and correcting biochemical abnormalities remain the primary goals of treatment, Correcting acidosis with bicarbonate administration, Hyperkalemia, which can be life-threatening should be treated, Correcting hematologic abnormalities, Dietary modulation is very important. Simple procedures to relieve the obstruction such as catheter placement,

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lithotripsy, prostatectomy, stent placement, or percutaneous nephrostomy can help prevent permanent renal damage.

▪ Indications for dialysis in patients with ARF are as follows:

1. Volume expansion that cannot be managed with diuretics
2. Hyperkalemia
3. Correction of severe acid-base disturbances
4. Severe azotemia (BUN >100)
5. Symptoms of uremic pericarditis, gastritis, seizures, or encephalopathy

Chronic Renal Failure

Chronic renal failure (CRF) is characterized by progressive destruction of renal mass with irreversible sclerosis and loss of nephrons over a period of at least months to many years. and the term CRF should be reserved more specifically for patients whose GFR is less than 30 cc/min. Chronic renal insufficiency (CRI) is the preferred term for patients with mild-to-moderate renal impairment, those whose GFR falls at 30-70 cc/min. End-stage renal disease (ESRD), usually associated with signs and symptoms of uremia, is the term reserved for patients whose GFR has declined to levels of less than 10 cc/min. A rise in plasma creatinine from a baseline value of 0.7 mg/dL to 1.4 mg/dL in a patient, although still within the reference range, actually represents a loss of 50% of functioning nephron mass. Incidence rate of 300 cases per million population.

Causes of CRF :

- Vascular disease - Renal artery stenosis, renal vein thrombosis
- Primary glomerular disease - Membranous nephropathy, immunoglobulin A (IgA) nephropathy
- Secondary glomerular disease - Diabetes mellitus, systemic lupus erythematosus, rheumatoid arthritis,
- Tubulointerstitial disease - Drugs, infection (viral, bacterial, parasitic),
- Urinary tract obstruction - Urolithiasis, benign prostatic hypertrophy, tumors, retroperitoneal fibrosis, urethral stricture, neuropathic bladder

Medical Care:

- Medical care of uremia.
- Renal replacement therapy can be accomplished by hemodialysis, peritoneal dialysis, or renal transplantation.

Surgical Care: Surgical referral is necessary for dialysis access placement after the decision regarding dialysis has been made. Dialysis access can be conducted through either an arteriovenous fistula for hemodialysis or a peritoneal dialysis catheter for chronic ambulatory peritoneal dialysis or continuous cycling peritoneal dialysis.

- Arteriovenous fistulas are the dialysis access of choice for hemodialysis.
- Peritoneal dialysis access can be accomplished by the placement of Tenckhoff peritoneal dialysis catheter.