Acute renal failure

[Note: some images may not be suitable for all readers]

Kidney anatomy

[Alternative Names] [Definition] [Causes, Incidence and Risk Factors] [Symptoms] [Signs And Tests] [Treatment] [Expectations (Prognosis)] [Complications] [Calling Your Health Care Provider] [Prevention]

Alternative Names

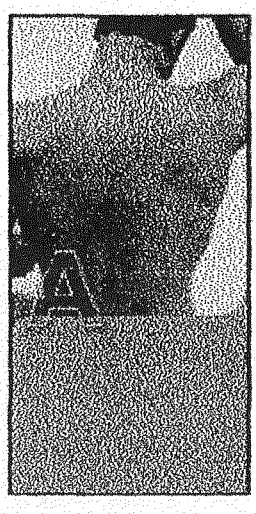
A.R.F.; acute kidney failure; kidney failure; kidney failure - acute; renal failure; renal failure - acute

Definition

Acute renal failure is a sudden loss of the kidneys' ability to excrete wastes, concentrate urine, and conserve electrolytes.

Causes, Incidence and Risk Factors

The kidneys filter wastes and excrete fluid when the pressure of blood in the bloodstream forces blood through the internal structures of the kidney. Decreased blood flow is one cause of damage to the kidney. It may occur when there is extremely low blood pressure from trauma, complicated surgery, septic shock, hemorrhage, burns and associated dehydration, or other severe or complicated illness.
Acute tubular necrosis (ATN) is another cause of acute renal failure. ATN may be caused by ischemia (decreased oxygenation of the tissues) from obstruction or stricture of the renal artery (see acute arterial occlusion of the kidney, renal artery stenosis). It may also occur following toxic injury to the kidney after exposure to metals, solvents, radiographic contrast, certain antibiotics and other medications, and other substances that are toxic to the kidney.



Myoglobinuria (myoglobin in the urine) may cause acute renal failure. This condition may be caused by rhabdomyolysis, alcohol abuse (see alcoholism), a crush injury, necrosis (tissue death) of muscles from any cause, seizures, and other causes.

Acute renal failure may follow direct injury to the kidney. It may also follow infections such as acute pyelonephritis or septicemia. It may be a consequence of urinary tract obstruction such as a narrowing of the urinary tract (stricture), tumor, kidney stones, nephrocalcinosis, or enlarged prostate with subsequent acute bilateral obstructive uropathy. Severe acute nephritic syndrome can cause acute renal failure. Other causes include disorders of the blood, such as idiopathic thrombocytopenic purpura (ITP), transfusion reaction, or other hemolytic disorders. Causes also include malignant hypertension and disorders associated with childbirth such as postpartum renal failure and bleeding associated with placenta abruptio or placenta previa. Autoimmune disorders such as scleroderma may cause acute renal failure.

Hemolytic uremic syndrome is one of the most frequent causes of acute renal failure in young children and appears to be increasing in prevalence. It is associated with the rapid onset of renal failure and other systemic manifestation. A toxin secreting bacterium, Escherichia coli, found in contaminated undercooked meats, has been implicated as the cause of hemolytic uremic syndrome.

Urine infection → Leads to Poisons → other organ problem → Septic Shock

Acute renal failure affects approximately 3 out of 10,000 people admitted to the hospital. The urine produced usually decreases in volume, and there may be no urine produced. This causes fluids and waste products to accumulate in the body. Lab tests show an accumulation of nitrogen wastes such as creatinine and urea in the body (azotemia). These waste products act as poisons when they accumulate in the body, damaging tissues and the functioning of many different organs. If the wastes are not removed from the body, death eventually results.

Symptoms

- decreased urine output (There may be none.)
  - decreased urine volume (oliguria)
  - no urine output (anuria)
- urination, excessive at night (can occur in some types of renal failure)
- ankle, feet, and leg swelling ?
- generalized swelling, fluid retention
- decrease in sensation, especially the hands or feet
- changes in mental status or mood → Not Depression
  - agitation
  - drowsiness, lethargic, hard to arouse
  - delirium or confusion
  - coma
  - fluctuating mood
  - difficulty paying attention (attention deficit)
  - hallucinations
- slow, sluggish, lethargic movement
- seizures
- hand tremor

Felt sick all the time - sick if she ate anything →

- nausea, vomiting
  - may persist for days
  - morning sickness
  - vomiting blood
- prolonged bleeding, bruising easily
  - stools, bloody
  - nosebleed - symptom
- growth, slow (child 0-5 years)
- flank pain
- fatigue
- ear noise/buzzing
- breath odor
- breast development in males
- blood pressure, high

Signs And Tests

Examination and testing may reveal acute renal failure rather than other disorders that affect kidney function. There is generalized edema (swelling) from fluid retention. Auscultation of the heart may show a or other abnormal sounds caused by increased fluids. Auscultation of the lungs may show crackles. Lab values may change suddenly (within a few days to 2 weeks):

- Urinalysis may be abnormal.
- Serum creatinine may increase by 2 mg/dL or more over a 2 week period.
- Creatinine clearance may be decreased.
- BUN may increase suddenly.
- Serum potassium levels may be increased.
- Arterial blood gas and blood chemistries may show metabolic acidosis.
- Kidney or abdominal ultrasound is usually the best test, but abdominal X-ray, abdominal CT scan, or abdominal MRI may also reveal the cause of the acute renal failure. Kidney size is usually normal or slightly large.
- Chemical tests of blood and urine (such as fractional excretion of sodium or fractional excretion of urea) may help to distinguish the causes. A clean catch urine specimen will indicate if the cause is infection within the urinary tract. Renal angiography (renal arteriography) may be used to diagnose causes within the blood vessels of the kidney.

WAS A URINE test done. →

This disease may also alter the results of the following tests:

- 25-hydroxy vitamin D
- amylase
- amylase, urine
- AST
- calcium (ionized)
- CO2
- creatinine - urine
- ESR
- nerve conduction velocity
- platelet aggregation test
- protein electrophoresis - urine
- RBC indices

- RT3U
- serum calcium
- serum chloride
- serum phosphorus
- serum sodium
- sodium, urine
- T4
- urea nitrogen: urine
- uric acid
- urinary casts
- urine 24h volume
- urine concentration test
- urine pH
- urine specific gravity

Treatment

The goal of treatment of acute renal failure includes identifying and treating any reversible causes of the kidney failure (e.g., use of nephrotoxic medications, obstructive uropathy, volume depletion...). Additionally, treatment focuses on preventing the excess accumulation of fluids and wastes, while allowing the kidneys to heal. The kidneys may gradually resume function. Hospitalization is required for treatment and monitoring.

Fluid intake may be severely restricted to an amount equal to the volume of urine produced. Salt intake is usually also curtailed. Dietary intake of substances that are normally excreted by the kidney may be restricted to minimize their build up in the body. Specific dietary modifications will include following a diet plan that is high in carbohydrates, low in protein, sodium, and potassium intake.

Antibiotics may be used to treat or prevent infection. Diuretics may be tried in an attempt to increase the excretion of fluid from the kidney. Medications may be given to control hyperkalemia (increased blood potassium levels).

A major priority in treatment is to control dangerous hyperkalemia (increased blood potassium levels). A variety of different medications may be utilized to reduce blood potassium including IV (intravenous) calcium, glucose/insulin, and oral or rectal administration of potassium exchange resin (Kayexalate).

Dialysis may be used to remove excess waste and fluids. This often makes the person feel better and may make the kidney failure easier to control. Dialysis may not be necessary for all people, but is frequently lifesaving, particularly if serum potassium is dangerously high. Decreased mental status, pericarditis, increased potassium levels, total lack of urine production, fluid overload, and uncontrolled accumulation of nitrogen waste products (serum creatinine > 10 mg/dl and BUN > 120 mg/dl) are common indications for dialysis.

SUPPORT GROUP:

The stress of illness can often be helped by joining support groups where members share common experiences and problems. See kidney disease - support group.

WAS Reversable.

Expectations (Prognosis)

Although acute renal failure is potentially life threatening and may require intensive treatment for a time, it usually reverses within several weeks to a few months after the underlying cause has been treated. A few people will progress to chronic renal failure and/or end-stage renal disease. Death is most common when the cause of the kidney failure is related to surgery or trauma, or when it occurs in people with coexisting heart disease, lung disease, or recent stroke. Old age, infection, loss of blood from the GI (gastrointestinal) tract, and progression of the kidney failure also increase the risk of death.

Complications

- increased risk of infections
- gastrointestinal loss of blood
- chronic renal failure
- end-stage renal disease
- damage to the heart or nervous system
- hypertension

Calling Your Health Care Provider

Call your health care provider if decreased urine output or other symptoms indicate acute renal failure may be present.

Prevention

Treatment of causative disorders may help to prevent acute renal failure. Many cases may not be preventable.