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**VETERINARY
SPECIALISTS**
State of the Art Care, In the Heart of the State

Acute Renal Failure (ARF)

What do kidneys normally do?

The kidneys function on many levels to maintain *homeostasis* (internal balance) in the body. The kidneys make urine and determine how concentrated or dilute the urine is (based on hydration status). In doing so, they regulate water, electrolyte, and pH (acid/base) balance in the body. Additionally, the kidneys help to excrete toxins, hormones, and drugs from the body and play a role in blood pressure regulation. Finally, kidneys make a hormone called *erythropoietin* which stimulates the bone marrow to make red blood cells.

What is acute renal failure (ARF)?

Acute renal failure is kidney dysfunction that results after a specific insult to the normal kidneys. The changes can be mild or severe and are highly dependent on the type and severity of injury present, as well as how quickly they are detected.

What causes ARF?

ARF results from a large number of causes. Examples of things that can lead to ARF include toxins (e.g. antifreeze, certain plants, non-steroidal pain medications, and grapes/raisins), infectious diseases (leptospirosis, other bacterial infections), cancer, urinary obstruction, trauma, systemic infection (*sepsis*), heat-related injury (*heat-stroke*), and decreased blood supply to the kidneys.

What clinical signs does ARF cause?

ARF may cause many or few clinical signs. The degree of clinical signs relates closely with the degree of injury to the kidneys. These signs arise not only because of the loss of kidney function, but because of the secondary internal effects that this causes.

Common signs include:

- Nausea
- Vomiting
- Anorexia
- Melena
- Polydipsia
- Polyuria
- Dehydration
- Lethargy

Less common clinical signs include:

- Blindness
- Seizures
- Bleeding disorders
- Oral ulceration
- Acute death



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- *Uremia* is the cluster of clinical signs resulting from kidney disease
- *Melena* is a dark, tarry stool indicative of gastrointestinal bleeding
- *Polyuria (PU)* is the increased urination that results when the kidney loses the ability to concentrate urine
- *Polydipsia (PD)* is the increased drinking that results secondary to the polyuria of kidney disease
- *Blood pressure* increase is common with ARF and can result in damage to the brain, eyes, kidneys and heart

What laboratory changes does ARF cause?

ARF can cause many changes on laboratory tests. Depending on the severity of disease, the changes may be mild or extreme. Because of the reserve capabilities that the kidneys have, many of these tests are insensitive and abnormalities only occur after 65% to 75% of normal kidney function is lost.

Common laboratory changes include:

- Dilute urine
- Electrolyte abnormalities
- Anemia
- Azotemia
- Urinary infection

- *Azotemia* is the increase in BUN and creatinine, two specific blood parameters measured on the chemistry panel
- *Isostenuria* is the production of dilute urine most common in kidney disease
- Common *electrolytes* affected in ARF include potassium, phosphorus, calcium and magnesium
- *Anemia* is the low red blood cell count that results from gastrointestinal bleeding in many ARF patients

What testing is recommended for ARF patients?

In evaluating patients with ARF, there are many things that need to be considered. A urinalysis is essential for confirming the diagnosis. In addition, a urine culture is used to assess for infection. A complete blood count (CBC) helps us to evaluate for anemia, signs of infection, and platelet changes. A chemistry profile evaluates for azotemia, electrolyte changes and other internal organ damage that may be present. *Leptospira* titers are submitted to check for this infectious disease. Blood pressure is checked because elevated blood



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pressure is common in ARF and can both worsen disease and cause other clinical signs. In certain cases, tests for toxins such as antifreeze are performed. Finally, abdominal ultrasound will aid in evaluation of the kidney and bladder structure, measurement of kidney size, and screening for other underlying diseases, such as kidney tumors. In many patients the cause of the ARF is not elucidated.

Most patients evaluated for ARF will need the following tests:

- Chemistry profile
- Urine culture
- Complete Blood Count (CBC)
- Urinalysis
- Blood pressure
- *Leptospira* titers
- Toxin testing
- Abdominal ultrasound

- *Abdominal ultrasound* is a non-invasive test that uses sound waves to create images of internal organs and structures
- Even with no signs of infection on the urinalysis, a urinary infection is still possible
- By evaluating all these tests *together*, we can confirm the diagnosis, provide an indication of severity of disease and prognosis, and help develop a treatment and monitoring plan

What treatment options are available for ARF patients?

The initial treatment is a two-pronged approach to maintain and improve kidney function, as well as treat the underlying cause. Fluid therapy is the foundation for treating most patients with ARF. Because there are so many potential causes of ARF, treatment beyond this varies quite a bit between patients.

What sort of monitoring is recommended for ARF patients?

The kidneys are generally slow to heal from acute injury. As such, after the initial visit/hospitalization, regular monitoring of labwork is recommended. Long-term monitoring beyond this is patient-specific and will depend on the severity of ARF and recovery that is made.



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What is the prognosis with ARF?

The prognosis with ARF is highly dependent on the severity and cause of disease. Some patients make a complete and remarkable recovery with little residual disease. Other animals will die from ARF. In many cases of ARF, the patient is predisposed to chronic renal failure (see handout at www.scvetspecialists.com). In most cases, the ability of an individual to recover can not be predicted at the time of presentation. We will keep you posted on your pet's progress and how this will affect prognosis and quality of life.