Acute on Chronic Kidney Disease

Any sudden decline in renal function in patients with known chronic kidney disease (CKD) requires rapid assessment, diagnosis and appropriate management to prevent an accelerated and possibly irreversible decline in renal function.

The patient may be known to have CKD or may be presenting for the first time, having been previously not known to have CKD.

Management is directed towards identification and treatment of the underlying cause of the acute deterioration of renal function, and treatment for acute kidney injury (AKI).

Causes of acute deterioration in chronic kidney disease

The most common causes are:

- Systemic infection - eg, urinary tract infection (UTI), chest infection, central line.
- Drugs - eg, diuretics, angiotensin-converting enzyme (ACE) inhibitors, aminoglycosides.
- Dehydration.
- Urinary tract obstruction or urinary retention - eg, due to spinal cord compression or neurogenic bladder, or renal vein thrombosis (particularly in patients with nephrotic syndrome).

Other likely causes include:

- Renal hypoperfusion secondary to dehydration from diarrhoea, diuretics, surgery or cardiac failure, pericardial tamponade, aortic dissection or renal vascular disease.
- Metabolic and toxic causes - eg, diabetic ketoacidosis, hyperosmolar coma.
- Hypercalcaemia.
- Hyperuricaemia.
- Progression of underlying diseases - eg, relapse of glomerulonephritis.
- Development of accelerated-phase hypertension.
- Pregnancy: at the end of the pregnancy or after delivery (eg, in patients with reflux nephropathy), pre-eclampsia, eclampsia.

Possible underlying causes of urinary retention and/or infection include:

- Papillary necrosis and sloughing.
- Stones.
- Pelvic malignancy.
- Bladder cancer.
- Polycystic cysts.
- Clot in the ureter.
- Contrast media (especially in diabetes).

Presentation

The patient may present with the cause of the exacerbation (eg, local infection), features of chronic failure or may present with AKI.

Assessment

Clinical assessment should include:
Identifying possible causes of acute exacerbation - e.g., drug history, signs of infection or evidence of prostatic hypertrophy.

- Identifying any degree of urinary tract obstruction.
- Assessment of pre-existing renal function and whether an episode represents acute on chronic kidney disease or acute kidney injury in a patient with previously normal renal function (see separate articles Chronic Kidney Disease (Chronic Renal Failure) and Acute Kidney Injury.
- Assessment of blood pressure and general cardiovascular status.

**Investigations**

- Serial assessment of renal function: estimated GFR (eGFR), serum urea, creatinine and electrolytes.
- Urine: urinalysis, microscopy, electrolytes and protein excretion.
- FBC.
- Infection swabs and cultures as appropriate.
- ECG: evidence of hyperkalaemia, myocardial infarction.
- Ultrasound scan of the urinary tract and lower abdomen to identify urinary tract obstruction or urinary tract abnormalities.
- Further investigations and management will depend on the well-being of the patient, likely cause of the exacerbation and current renal function.
- A full assessment, as described in the separate article Acute Kidney Injury, may be required.
- Renal biopsy may also be required.

**Differential diagnosis**

Other causes of raised urea and creatinine:

- Raised urea can also be caused by intravascular volume depletion, diuretics, congestive heart failure, gastrointestinal bleeding, corticosteroids and tetracyclines.
- Creatinine levels can be increased by muscle damage (rhabdomyolysis) and decreased tubular secretion - e.g., cimetidine, trimethoprim.
- Ingestion of cooked meat and severe exercise cause a rapid but temporary rise in serum creatinine.

**Management**

- Management involves treatment of the underlying cause and management of acute injury.
- Depending on the nature and certainty of the cause, clinical well-being and underlying renal function, patients often require referral to hospital for full assessment and appropriate management.
- However, some patients with an obvious cause and who are clinically stable, may be safely managed at home.

**Prevention**

- Regular monitoring and early effective treatment of any potential cause of acute deterioration of renal function.
- Many commonly used drugs and procedures can potentially cause AKI, and patients with decreased GFR have an increased risk of drug-induced injury. Non-steroidal anti-inflammatory drugs, phosphorus-based enemas and iodinated contrast should particularly be avoided if possible.

**Further reading & references**

- UK National Kidney Federation
- Detection, Monitoring and Care of Patients with Chronic Kidney Disease; Renal Association (2011)
- Chronic kidney disease - not diabetic; NICE CKS, July 2009 (UK access only)
- Peritoneal dialysis in chronic kidney disease; Renal Association (2010)

1. Acute Kidney Injury; Renal Association (2011)
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