Acute renal failure (AKI)

Acute Renal Failure (ARF), or Acute Kidney Injury (AKI) is when the kidneys suddenly stop working properly. This can be partial or complete. If it is complete, you can't live for very long without some kind of treatment.

What causes ARF/AKI?

- **Pre-renal** – things that reduce the blood supply to the kidney. For example dehydration, or low blood pressure from other causes such as bleeding, heart failure, severe infectiion. More likely in the presence of some medicines, such as ACE inhibitors, or non-steroidal anti-inflammatory drugs (NSAIDs), or diuretics. Replacing fluid with IV fluids, and using other treatments to improve the circulation, may help.
- **Renal** – toxins or diseases affecting the kidney. This is the rarest type of ARF, but if it looks likely, a kidney biopsy is often necessary to sort out the exact cause.
- **Post-renal** – things that block the flow of urine, for example blockages in the ureters or bladder or prostate. It's important to spot these so that the obstruction can be relieved, and then with luck kidney function should improve rapidly. Ultrasound or other imaging tests usually show that urine outflow is obstructed. More on obstruction.

Established ARF/AKI – acute tubular necrosis

Established ARF that cannot be reversed by getting fluids right or removing toxins because the damage is too severe or the problem too long-lasting. This often puts the kidney into a state of 'hibernation' during which very little urine is produced. Under the microscope at this time the tubules of each nephron look sick and this appearance is called Acute Tubular Necrosis, or ATN.

This is the commonest cause of acute renal failure in patients referred to renal units for dialysis for ARF/AKI. You usually just have to sit it out until the kidneys recover. This may take days to weeks. During that time, careful monitoring of fluids and diet is required, and temporary support by dialysis is often necessary, to give time for the kidneys to recover. Nothing is yet know to speed up recovery.

Dialysis (removal of toxins from blood) may be necessary when

- Potassium or other toxins build up to dangerous levels in the blood
- There is fluid (salt and water) overload, causing breathlessness or severe oedema (swelling)
- There are other severe symptoms

When AKI is prolonged, infections and malnutrition can be serious problems.

Diagnosing the cause

Often it is obvious, because the AKI occurs at a time of severe illness. However

- Talking to the patient, finding what drugs they've been given, and what has happened during the illness are important. Old blood test results are valuable.
- Ultrasound or other imaging will usually rule out (or prove) obstruction, and show whether the kidneys are a normal size. Small kidneys suggest previous kidney disease. Damaged kidneys are more likely to develop AKI.
- Urine testing is important to look for infection, or signs of kidney inflammation.
- A range of special tests may be valuable when the cause isn't obvious.
- Kidney biopsy is valuable in a minority of patients.

What are the treatments

General care and to replace kidney function

- Careful monitoring of fluid intake and output, diet, drugs, prevention of infections.
- Dialysis via haemodialysis machines – may be given every day or less often.
- Continuous blood purification treatments – such as continuous dialysis or haemofiltration, may be given, especially on intensive care units. These don't necessarily work better, but can be easier in patients who are critically ill.
- Peritoneal dialysis – can be used, but in developed countries is less often used for AKI these days.

Treatments for the cause

- **Obstruction** – relief of the blockage usually makes the situation much better.

- **Pre-renal** – once ATN is established, there is no treatment that is proven to speed recovery, but early treatment with fluids etc may help this developing.
- **Renal** – some causes benefit from urgent treatment. Examples include:

  Acute interstitial nephritis
  Crescentic nephritis
  Glomerulonephritis – may need special treatments too

Will any damage remain?

Although many people recover almost completely from AKI, some are left with some kidney scarring and reduced kidney function. This depends on the cause and the severity, and how young and fit you are when it happens.

A small proportion of people don't recover and end up with end-stage renal failure. This is unusual.

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