CONDITION

Renal papillary necrosis

Renal papillary necrosis is the death of tissue at the tips of the kidney's urine-collecting structures.

WHAT IT IS
Tissue death at the tips of kidney collecting structures

BODY SYSTEM
Kidneys and urinary system

MAIN SYMPTOMS
Blood in urine, flank pain, fever, passing tissue

WHAT CAUSES IT
Reduced blood flow from medicines or illness

HOW IT IS DIAGNOSED
CT urography, sometimes ureteroscopy or tissue examination

MAIN TREATMENT
Treating the cause, infection, and urinary blockage

CAN IT BE CURED?
Sometimes - trigger removed and complications treated

IS IT AN EMERGENCY?
Sometimes - fever with pain or blocked urine flow

LONG-TERM OUTLOOK
Often stable; extensive damage can impair kidney function

Overview

Renal papillary necrosis is damage and tissue death in the renal papillae. These are the tips of small structures inside each kidney that drain urine into the kidney's central collecting space.

"Necrosis" means tissue death. It happens when the papillae do not receive enough blood and oxygen, or when medicines or illness directly injure them. A damaged papilla may remain in place, form a scar, or separate and pass into the urine. This separated tissue is called a sloughed papilla.

Renal papillary necrosis is a condition caused by other health problems or exposures rather than a single disease. It can affect one or both kidneys and may involve one papilla or many. Some people have no symptoms, particularly when the affected area is small.

The damage matters because a sloughed papilla can block urine flow. Extensive or repeated injury may also reduce kidney function. Finding and managing the cause can help prevent further damage, although tissue that has already died does not grow back.

Symptoms

Symptoms may begin suddenly, develop gradually, or be found during testing for another problem. They can resemble a kidney infection or kidney stone.

Possible symptoms include:

Blood may sometimes be present only in amounts found by a urine test. Passing tissue is suggestive of papillary necrosis but is not always noticed.

Reduced kidney function may cause few symptoms at first. More serious loss of function can lead to reduced urine output, swelling, tiredness, nausea, or shortness of breath. These symptoms can have many causes and require medical assessment.

- Blood in the urine, which may look pink, red, or brown
- Pain in the side or back below the ribs, known as flank pain
- Cramping pain if tissue or a blood clot moves through the ureter
- Fever, chills, or painful urination when infection is present
- Passing small pieces of pale or dark tissue in the urine
- Nausea or vomiting during an episode of severe pain
- Needing to urinate more often

Causes and risk factors

The renal papillae have a limited blood supply and are exposed to concentrated urine. This makes them vulnerable to reduced blood flow, inflammation, infection, and certain medicines.

Recognised causes and risk factors include:

Having one risk factor does not mean you will develop the condition. More than one factor may be present, and sometimes the exact cause is not clear.

- Long-term or heavy use of some pain medicines: This is especially associated with analgesic kidney damage. Nonsteroidal anti-inflammatory drugs like ibuprofen or naproxen , or NSAIDs, can reduce blood flow within the kidneys.

- Diabetes: Diabetes can affect small blood vessels and increase the risk of urinary infection. The risk is greater when diabetes and a kidney infection occur together.
- Kidney infection: Severe or repeated pyelonephritis, meaning infection within the kidney, can damage papillary tissue.
- Sickle cell disease or sickle cell trait: Red blood cells can obstruct the papillae's small blood vessels, especially when conditions promote sickling.
- Urinary blockage: Stones, narrowing, or another obstruction can raise pressure and contribute to infection and tissue injury.
- Other conditions affecting blood flow: These include severe dehydration, circulatory shock, and some blood-vessel disorders.
- Less common causes: Kidney tuberculosis, liver cirrhosis, and complications affecting a transplanted kidney have been associated with papillary necrosis.

Diagnosis

Your symptoms, medical history, medicines, and underlying conditions help guide testing. It is important to mention non-prescription pain medicines and combination products, as well as any history of diabetes, urinary infections, stones, or sickle cell conditions.

Urine tests can look for blood, infection, protein, and pieces of tissue. A urine culture checks whether bacteria are growing and can help guide treatment for infection. Blood tests measure kidney function and may show signs of infection or blood loss.

Imaging is usually needed to identify the characteristic changes. CT urography is a CT scan performed while contrast material passes through the kidneys and urinary tract. It can show irregular papillae, small cavities where tissue has separated, calcification, or a sloughed papilla causing blockage.

Contrast is not suitable for everyone. The imaging plan may be adjusted if kidney function is reduced, there is a previous contrast reaction, or another clinical concern is present. Ultrasound can show swelling caused by blocked urine, but it may not detect early papillary damage. MRI or specialised X-ray studies may sometimes be used.

Ureteroscopy may be needed when imaging is uncertain or blockage must be treated. During this procedure, a thin viewing instrument is passed through the urinary tract. Examination of passed or removed tissue can confirm necrosis, although a tissue sample is not required in every case.

Testing also helps rule out kidney stones, blood clots, tumours, and other causes of blood in

the urine.

Treatment and management

Treatment focuses on stopping further injury, dealing with the underlying cause, and keeping urine flowing. There is no treatment that restores a papilla after the tissue has died.

If a pain medicine is contributing, a clinician may recommend stopping it or changing how pain is managed. All prescription and non-prescription products should be reviewed because some combination medicines contain more than one pain reliever. Avoiding one harmful product while continuing another similar medicine may not protect the kidneys.

A bacterial kidney or urinary infection is treated with antibiotics like amoxicillin or doxycycline . Treatment may begin before the culture result when the infection is significant, then be adjusted when the specific bacterium is known.

A sloughed papilla can lodge in a ureter, the tube carrying urine from a kidney to the bladder. If this blocks urine flow, treatment may include:

Diabetes, sickle cell conditions, urinary stones, and other contributing illnesses need ongoing management. This lowers the chance of additional injury but cannot reverse existing necrosis.

Severe acute kidney injury may require hospital monitoring and temporary dialysis. Dialysis filters waste and extra fluid from the blood when the kidneys cannot do so adequately. Surgery to remove a kidney is uncommon and is generally considered only for severe complications, such as an extensively damaged, non-functioning kidney with ongoing infection.

- Removing tissue with a small endoscopic instrument
- Placing a temporary ureteral stent to hold the drainage path open
- Draining the kidney through the skin with a nephrostomy tube

Complications

A detached papilla may block part of the urinary tract. This can cause severe pain and hydronephrosis, which is swelling of the kidney because urine cannot drain normally.

Urine trapped behind a blockage is more likely to become infected. Infection involving a blocked kidney needs urgent treatment because drainage and antibiotics may both be required. An infection can occasionally spread into the bloodstream and cause sepsis.

Other possible complications include:

The amount of papillary damage does not always match the level of kidney impairment. People with limited, one-sided injury may retain normal overall kidney function.

- Repeated blood in the urine
- Recurrent urinary infections
- Calcium deposits within damaged papillae
- Acute kidney injury during a severe episode
- Chronic kidney disease after extensive or repeated damage

Prevention

Renal papillary necrosis cannot always be prevented. Inherited risks, including sickle cell disease or trait, cannot be removed. Some episodes occur despite appropriate care.

You can reduce avoidable risks by using pain medicines only as directed and checking whether different products contain the same ingredients. If you need pain relief regularly, ask for a medicine review rather than continuing long-term self-treatment.

Good management of diabetes, sickle cell conditions, and recurring urinary problems may reduce further kidney stress. Urinary infections and possible blockages should be assessed promptly, particularly if they cause fever or flank pain.

If you have previously had papillary necrosis, follow the specific advice given about medicines, hydration, laboratory monitoring, and treatment of the underlying cause.

Living with it and what to expect

The outlook is shaped by how much tissue is affected, whether one or both kidneys are involved, and whether the cause can be controlled. A single limited episode may settle after infection or blockage is treated. Existing dead tissue will not recover, but the unaffected parts of the kidneys may continue to work normally.

Papillary necrosis may return if the trigger continues. Repeated injury is more likely when an underlying condition remains active, urinary blockage recurs, or kidney-harming medicines are still being used.

Follow-up may include kidney function blood tests, urine tests, blood pressure checks, and repeat imaging. Imaging is more likely when symptoms continue, kidney function changes, or there is concern about obstruction.

Many people with limited damage and a corrected cause remain well without major restrictions. More extensive disease may lead to chronic kidney disease and the need for long-term kidney care. Day-to-day life then depends more on the level of kidney function and the underlying illness than on the papillary injury itself.

When to get medical help

Arrange prompt medical assessment if you notice blood in your urine, even if it is painless or happens only once. Also seek advice for persistent flank pain, repeated urinary infections, painful urination, or possible tissue in the urine. These symptoms do not prove papillary necrosis, but they need an explanation.

Seek urgent same-day care for fever or chills with flank pain, particularly if you have diabetes, a sickle cell condition, reduced immunity, or known urinary blockage.

Go to emergency care if you have:

These signs may indicate blocked urine flow, a serious infection, heavy bleeding, or acute loss of kidney function.

- Severe or rapidly worsening flank pain with fever
- An inability to urinate or a sudden major reduction in urine
- Heavy bleeding, large blood clots, or difficulty passing urine
- Confusion, fainting, marked weakness, or difficulty breathing
- Persistent vomiting that prevents you from keeping fluids down

Common questions

Is renal papillary necrosis cancer?

No. It is tissue death caused by injury or reduced blood supply, not cancer. However, blood in the urine can also come from a urinary tract tumour, so it should not be assumed to have one particular cause without testing.

Can renal papillary necrosis heal?

Dead papillary tissue does not regenerate. Symptoms and complications can resolve after the cause is controlled, and the remaining kidney tissue may continue to function well. Further damage may be preventable.

Can NSAIDs cause renal papillary necrosis?

Long-term or heavy exposure to NSAIDs can contribute to papillary necrosis by reducing kidney blood flow. Risk is affected by the amount and duration used, other medicines, hydration, kidney function, and underlying illness. Do not stop a prescribed medicine without discussing why it was recommended and what alternatives are appropriate.

Will I need dialysis?

Most limited cases do not automatically lead to dialysis. Dialysis may be needed if extensive injury causes severe acute kidney failure or if chronic kidney disease progresses to advanced loss of function.

Can a sloughed kidney papilla pass on its own?

Small pieces may pass in the urine without treatment. A larger piece can become stuck in a ureter and cause pain, bleeding, infection, or blocked drainage. Blockage may require endoscopic removal, a stent, or another drainage procedure.

Is renal papillary necrosis the same as a kidney stone?

No. A kidney stone is a hard deposit made from substances in urine. A sloughed papilla is damaged kidney tissue. Both can cause flank pain, blood in the urine, and urinary blockage, so imaging may be needed to tell them apart.

Sources

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