

Renal biopsy

What is a renal biopsy used for?

Renal biopsy can provide a definitive histological diagnosis of glomerular or interstitial disease:^[1]

- It is particularly helpful in patients with:
 - Severe proteinuria.
 - Haematuria that is not due to disease of the lower urinary tract.
 - [Acute kidney injury](#) thought to be caused by intrinsic renal disease.
- The main diseases diagnosed by renal biopsy include glomerulonephritis, other glomerular disorders such as amyloidosis and diabetes and interstitial nephritis.

Renal biopsy is an important investigation in the management of patients who have had a [renal transplant](#):

- Postoperative oliguria: to differentiate acute ischaemic tubular necrosis caused by drug toxicity, acute rejection or infarction.
- Further biopsies may be required to monitor the response to anti-rejection therapy, and examine for recurrence of the original renal disease or the development of glomerulonephritis in the graft.

Histological samples do not always provide a definitive answer and the findings should be interpreted in the context of the history and other investigations. Accurate diagnosis and assessment of prognosis can be affected by sampling error, especially in focal pathologies, or where too few glomeruli have been captured. Histological findings are not always specific, eg, interstitial fibrosis and tubular atrophy are signs of chronic damage, rather than pointing towards a diagnosis.^[2]

Indications^[3]

- Proteinuria and **haematuria**:
 - Isolated microscopic haematuria or proteinuria of less than 1 g/24 hours is not usually indication for renal biopsy because it is unlikely that any specific treatment would be required.
 - Microscopic haematuria with dysmorphic red cells or casts, a possible hereditary condition, associated proteinuria, hypertension or reduced glomerular filtration rate (GFR) would be considered an indication for biopsy.
 - Low levels of proteinuria associated with haematuria, hypertension or reduced GFR would also be considered as an indication for biopsy.
 - Higher levels of proteinuria (more than 1 g/24 hours) or the combination of proteinuria and haematuria (especially with casts) are indications for biopsy, because of the potential of effective treatment for glomerulonephritis and interstitial nephritis.
 - **Nephrotic syndrome**: in patients less than 1 year or above 10 years of age. Children between the ages of 1 and 10 years usually have minimal-change nephropathy, which responds to steroid treatment; therefore, the risks of biopsy are thought to outweigh the likely benefits of treatment. However, these children may need biopsy if there is a poor response to initial treatment.
- **Acute kidney injury**:
 - To exclude ischaemic acute tubular necrosis: with abnormal urinary sediment, proteinuria, positive antineutrophil cytoplasmic antibody (ANCA)/antinuclear antibody (ANA)/antiglomerular basement membrane (anti-GBM) antibody results, severe hypertension, no obvious cause or prolonged history.
 - Presumed ischaemic acute tubular necrosis: biopsy is indicated if recovery is delayed.

- **Chronic kidney disease:** equal-sized kidneys which are not small and shrunken, with proteinuria or dysmorphic haematuria.
- Known renal diagnosis: equal-sized kidneys which are not small and shrunken, with sudden unexplained reduction of GFR or unexplained increased proteinuria.
- Other possible indications may include **diabetic kidney disease** and **lupus nephritis**.^[2]

Contra-indications and precautions^[2]

Relative contraindications

- Hypertension: increased risk of bleeding.
- Coagulopathy should be corrected prior to biopsy; antiplatelets and anticoagulants should be held.
- Renal asymmetry: suggests a process affecting the kidneys differentially, eg, renal artery stenosis.
- Small kidneys on imaging: suggests damage is chronic and irreversible; would be technically difficult and nonspecific fibrotic changes are likely to be found on biopsy.
- Single kidney: not routinely biopsied due to the risk of complications leaving the patient with renal failure; however, a biopsy may be justified if there is a chance of discovering a treatable cause of kidney injury that would otherwise cause end-stage disease.

Absolute contraindications

- Active pyelonephritis or skin infection at site of needle insertion: increased risk of sepsis.
- Uncontrollable hypertension or coagulopathy: increased risk of bleeding.
- Unable to tolerate the procedure.

Technique

- Before biopsy is performed:
 - Check FBC, coagulation screen and bleeding time.
 - Obtain written informed consent.
 - Ultrasound: risk of biopsy is increased if there is only one kidney.

The patient usually lies face down on the bed or couch with a pillow under the stomach. The exact position of the kidney is determined using ultrasound. Using local anaesthetic, the biopsy needle is passed through the numb area and the kidney biopsy taken. The patient should hold their breath for a few seconds as the kidney moves during breathing. Two or three biopsy samples may be taken.^[4]

Complications^[2]

Major complications from kidney biopsy are related to bleeding: haematoma formation (11%); bleeding requiring transfusion (1.6%); pain (4.3%); macroscopic haematuria (3.5%); and, rarely, death (0.06%).

Patients with hypertension, high creatinine, thrombocytopenia, anaemia or requiring early recommencement of anticoagulation are at higher risk of severe bleeding. If these cannot be corrected pre-biopsy and biopsy is essential, then close monitoring is recommended with additional risks discussed with the patient.

Patients should be monitored for 6–8 hours post-procedure and higher risk candidates may be admitted overnight. Any haematuria post-biopsy warrants admission to gain intravenous access and assess full blood count. Computed tomography angiography may be required to identify active bleeding points amenable to endovascular intervention.

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