



RENAL FINE NEEDLE ASPIRATION AND BIOPSY

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CHRONIC KIDNEY DISEASE (CKD)

Chronic Kidney Disease causes significant morbidity and mortality in the feline patient, particularly the senior cat in which the prevalence of the disease is known to be much higher. CKD is not a single entity, but rather encompasses a range of disorders which cause a decline in renal function. Acute kidney injury secondary to nephrotoxins, pyelonephritis or ischaemic injury may also progress to CKD. A diagnosis of CKD in cats is generally based on abnormalities in blood and urine testing and sometimes by diagnostic imaging studies. Renal biopsy or aspirates may be useful in determining a definitive diagnosis, elucidating mechanisms of injury and aetiopathogenesis, and providing information regarding severity of disease which may aid in establishing prognosis.

A previous study of cats with confirmed CKD in which histopathological examination of renal tissue was performed documented tubulointerstitial nephritis of unknown cause in over 50% of the cats.¹ Renal biopsy or aspiration is unlikely to be of benefit in such cases as the long-term management will not be altered by the biopsy results. Therefore, it is generally recommended that renal biopsy or aspirates in cats in International Renal Interest Society (IRIS) stage III and IV CKD should be avoided. However, there remain a small number of patients which are non-azotaemic or only mildly azotaemic in which renal biopsy or aspirates may be helpful. Renal biopsy or aspirates may be indicated in investigations of patients such as those with renomegaly, irregular kidneys, infiltrative disease or persistent proteinuria with no other identifiable cause. The collection of renal tissue from a patient should only be performed when it is considered that identification of pathological changes may have potential utility in modifying therapeutic options for the patient. However, the risk of the

procedure must always be weighed up against any potential benefit, especially in cats with more advanced CKD.

RENAL BIOPSY

Renal biopsy may be more helpful in diffuse disease processes. There are several techniques available for renal biopsy. The percutaneous transabdominal approach is probably the most commonly employed and is usually performed under ultrasound guidance. Various needles can be used, such as a Tru-cut biopsy needle or alternatively spring-loaded disposable biopsy needles or a long large gauge needle. In addition, renal biopsies can be obtained laparoscopically or surgically. Laparoscopic and surgical approaches allow direct visualisation of the kidneys and peritoneum but are more invasive than the percutaneous approach. The aim of a renal biopsy is to obtain tissue from the renal cortex. This is because there can be damage to large vessels resulting in significant haemorrhage or areas of infarction if the corticomedullary junction is crossed. If using the ultrasound guided percutaneous technique, visualisation of the kidney in sagittal or dorsal plane is recommended and the cortex should remain within the plane of view in which the biopsy needle will be directed. The skin over the biopsy collection should be cleaned and ideally sterile coupling gel used for the ultrasound probe. Some clinicians prefer to make a small skin incision to facilitate passage of the biopsy needle through the cutaneous tissue. The biopsy needle is

inserted through the renal capsule and directed within the renal cortex. Care should be taken particularly with spring-loaded biopsy needles to ensure that the needle remains in the cortex when collecting the sample. For more detailed information regarding collection are renal biopsies, readers are directed to a review article.²

RENAL FINE NEEDLE ASPIRATION

Fine needle aspiration may be best utilised in cases in which a focal mass is visualised in the kidney on ultrasound examination. It may also be helpful if there is a clinical suspicion of diffuse lymphoma involving the kidneys (see fig 1). It is generally unhelpful in cases of glomerular disease and interstitial nephritis. Percutaneous fine needle aspiration of the kidney should be performed under ultrasound guidance. Aspirates can be obtained blind but this is not recommended. A 21 to 23 gauge needle is generally recommended with the length dependent on the expected depth of the kidneys within the abdomen. The needle is inserted into the renal capsule similar as to when obtaining a renal biopsy

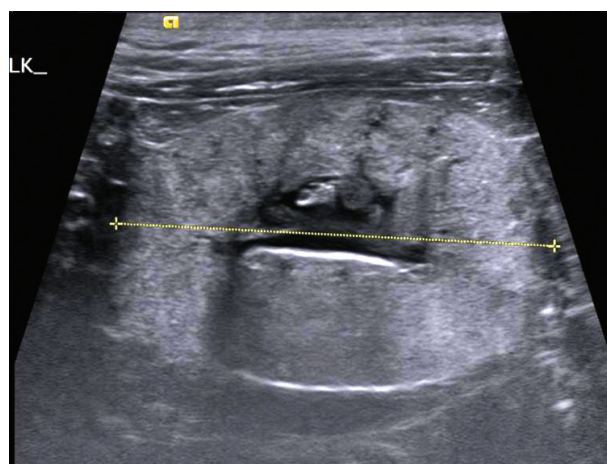
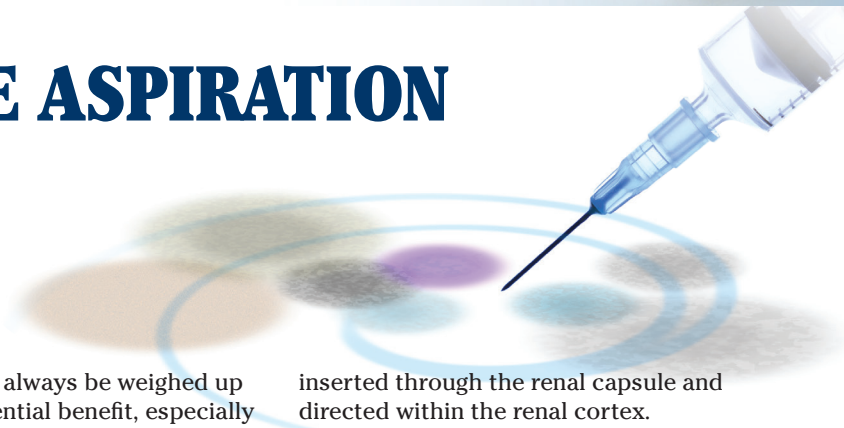


Figure 1: Ultrasound image of a kidney from a cat with renal lymphoma (courtesy of Virginie Barberet, University of Bristol).

and directed within the cortex. The needle is moved to and fro within the kidney. Negative pressure and suction using a syringe is not required as cells exfoliate relatively well. The needle contents are expelled onto a microscope slide and the smear prepared using standard smear preparation techniques. A major disadvantage of renal aspirates is that small sample size may limit the cytological interpretation of renal aspirates.

POTENTIAL COMPLICATIONS OF RENAL BIOPSY AND FINE NEEDLE ASPIRATION

The procedures should only be performed in patients which are clinically stable. Both renal biopsy and collection of aspirates are required to be performed under sedation or general anaesthesia to ensure adequate immobilisation of the patient. Sedation or general anaesthesia may also be of concern in a patient which may already have compromised renal function. Only clinicians competent and confident in performing the procedures should undertake the collection of samples. Complications associated with renal biopsy or aspiration includes haemorrhage (which may be severe enough to require blood transfusion), hydronephrosis secondary to renal pelvis obstruction, renal infarction, renal infection and death.

Complications have been reported in 18.5% of cats undergoing renal biopsy³ however, this study did include cats with more severe kidney disease; in cats with less severe disease the complication rate may be lower. The mortality rate associated with renal biopsy in cats has been reported to be 3.1%.³ The risk of haemorrhage is increased in patients with prolonged clotting times or thrombocytopaenias. Evaluation of coagulation status and platelet count is recommended to be included in the diagnostic work-up prior to performing the procedure to minimise these risks. Histopathological changes within the kidney considered to be related to performing a renal biopsy have been documented following the procedure although obtaining renal biopsies is not reported to have any effect on renal function in healthy cats.⁴ Similar data is not available for cats with pre-existing kidney disease.

FURTHER CONSIDERATIONS RELATING TO RENAL BIOPSY AND FINE NEEDLE ASPIRATION

A study evaluating agreement between histopathological diagnosis made at post-mortem and that made by renal biopsy reported agreement in 60% of dogs and 35.7% of cats.³ A recent study

evaluating concordance between final diagnosis and that made on renal fine needle aspirates reported 54% of results in cats to be in agreement, however, this increased to 79% in cases of renal neoplasia.⁵ In this study 30% of samples were considered to be inadequate for cytological evaluation.

When submitting renal tissue for histopathological examination it is advisable to seek the expertise of a renal pathologist. Submission of samples to a specialist nephropathologist will ensure that any significant changes are detected and correctly characterised to yield the most information. A specialist pathologist will also be able to examine renal tissue with traditional light, electron and immunofluorescent microscopy, provided that the sample has been processed in the correct way. In addition, special staining techniques can be applied to the samples. Diagnostic veterinary renal pathology centres are generally able to provide packages containing the appropriate instructions, materials, fixatives and submission pots for sample collection. Further information regarding recommended histopathological examination and special staining techniques is available in a recent review article.⁶

WSAVA RENAL STANDARDISATION STUDY GROUP

Renal biopsy may be helpful in increasing our understanding of the pathology of renal diseases. A scheme is currently under way to attempt to establish a consensus on characterisation of glomerular disease in proteinuric canine patients and correlate this with clinicopathological findings and long term outcome. Future work will include standardisation of feline renal disease. Information regarding the Renal Standardisation Study Group can be found by visiting the WSAVA website: www.wsava.org.

In addition, details of centres providing diagnostic renal pathology services can also be found on the website.

SUMMARY

Renal biopsy or fine needle aspirates may be helpful in obtaining a diagnosis particularly in certain disease processes such as neoplasia or in severe proteinuria in cats. However, they are not benign procedures and there are risks and complications associated. The diagnostic utility of renal biopsy or aspiration currently remains controversial. Future standardisation schemes may be helpful in providing further information regarding the collection of renal biopsies in cats.

The most important question may be whether the information obtained through performing renal biopsy or aspirates alters patient management and care. Prospective studies to answer this question remain to be performed in cats.

References and further reading

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