HANDLING AND PROCESSING OF A RENAL BIOPSY

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Renal biopsy, a relatively safe medical procedure, has gained considerable importance for the diagnosis of medical renal diseases. A close cooperation between nephrologist and pathologist is required for obtaining relevant and accurate information from the renal biopsy.

Now-a-days, a spring-loaded automated cutting needle, with or without ultrasound guidance, is used for obtaining renal tissue core. Lower pole of native left kidney and most visible or accessible pole of transplanted kidney are utilized for renal biopsy. In adults, 14- or 16-gauge needles are suitable, considering the internal diameter of 900-1000 micron and 600-700 micron, respectively (average diameter of normal glomerulus in adult is 200-250 micron). Finer needle of 18-gauge (internal diameter 300-400 micron) may be used for children younger than 8 years.

Adequacy of biopsy

The minimum diagnostic sample size varies with the specific diagnosis; for instance only one glomerulus is enough for making a diagnosis of membranous glomerulonephritis while 25 glomeruli may be required to make an accurate diagnosis of focal lesion like FSGS. For most of the light microscopic assessment, 8-10 glomeruli are considered adequate.

The adequacy of the renal tissue core should be assessed on-site using a dissecting microscope. The tissue sample should be transferred using a wooden spatula to a glass slide with few drops of saline and examined. Under a dissecting microscope, glomeruli appear as reddish, circular structures while medulla is identified by red streaks running almost parallel.

If possible, 2-3 cores should be taken: one for light microscopy (LM), another for immunofluorescence (IF) and one for electron microscopy (EM), if required. In cases where taking extra passes is not possible, a cutting protocol may be followed: both the ends of the core are taken for EM, one-third of the core, including some glomeruli, is placed in transport medium for IF and the rest is kept for LM.

Precautions while dividing renal tissue cores:

- Forceps should not be used, as they may lead to crush artefacts.
- Avoid touching the tissue with a fixative-contaminated scalpel or blade; this may contaminate the tissue meant for IF.

Fixatives and transport media

Light microscopy: The most commonly used fixative for LM is 10% buffered formalin, which provides good morphological details and allows immunohistochemistry or molecular studies, if needed later. Some laboratories prefer alcoholic Bouin's or Zenker's fixatives for better morphological details. However, these interfere with recovery of material for EM, IHC or molecular studies. Another fixative that might be used is 4% paraformaldehyde, which provides superior molecular stabilization for subsequent IHC or in-situ hybridization.

Immunofluorescence: The tissue for IF can be directly frozen, if the renal pathology laboratory is close to the biopsy suite. Otherwise, it can be transported in Michel transport media, in which the tissue is stable for as long as a week.

Electron microscopy: For EM, the tissue may be fixed in 2-3% glutaraldehyde or 1-4% paraformaldehyde. Glutaraldehyde needs to be refrigerated and fixation allowed for few hours before removing the tissue for further processing. In cases where the sample processed for EM does not show any glomeruli, tissue from the paraffin block may be reprocessed for EM; this is good enough for electron-dense deposits though several cellular artefacts may result.

What clinical information is indispensable to the pathologist?

The absence of adequate pertinent clinical information seriously hinders with any meaningful evaluation of renal biopsy. Ideally, the renal biopsy should be accompanied by a duly filled requisition form. Detailed clinical history, including past medical illnesses; recent laboratory values with particular emphasis on urinanalysis, biochemical parameters (urea, creatinine, total protein, cholesterol), serological investigations (ANA, dsDNA, ANCA, C3, C4, anti-GBM), viral markers (hepatitis B, hepatitis C, HIV) and other parameters of interest should be included. Details of any therapy administered should also be mentioned.

Hence, it needs to be remembered that renal pathology cannot succeed as a stand-alone practice. An extremely close collaboration and group effort between nephrologist and nephropathologist is the key to achieving appropriate management of patients.

Further Suggested Reading

1. Primer on the pathologic diagnosis of renal disease. In: Heptinstall's Pathology of the Kidney, 6th edition.
2. Amann K, Haas CS. What you should know about the work-up of a renal biopsy. Nephrol Dial Transplant 2006;21:1157-61.
3. Walker PD. The renal biopsy. Arch Pathol Lab Med 2009;133:181-8.