

EVALUATING NEEDLE TRAJECTORY AND GAUGE FOR OPTIMAL RENAL BIOPSY IN CATS

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INTRODUCTION

Renal disease research has focused on improving kidney assessment techniques, but information on the most suitable biopsy methods in domestic cats remains limited. This study aimed to determine the optimal needle gauge, insertion site, and angle to enhance tissue quality while minimizing complications in feline renal biopsies.

METHODOLOGY

Four feline cadavers without renal abnormalities were divided into two experimental groups. Three cadavers underwent renal biopsy using semi-automatic Tru-Cut needles (US BIOPSY, Franklin, USA) with gauges of 14, 16, and 18G at the cranial, caudal, and lateral kidney margins (Tru-Cut Group). The fourth cadaver's kidneys were sectioned sagittally and transversely to match the diameters of the needles used in the study. These samples were subjected to virtual modeling to estimate the theoretical maximum number of glomeruli retrievable based on needle gauge, insertion orientation, and depth, using ImageJ software (Virtual Biopsy Group).

RESULTS

The results indicated that the number of retrieved glomeruli varied with needle gauge and sampling site. The 18G needle retrieved fewer glomeruli compared to the virtual model, whereas the 14G needle collects more glomeruli in both groups, albeit causing significant macroscopic damage to the kidneys. Both the 14G and 16G needles yielded similar glomerular counts to the virtual group and Tru-Cut collection sites ($p < 0.05$).

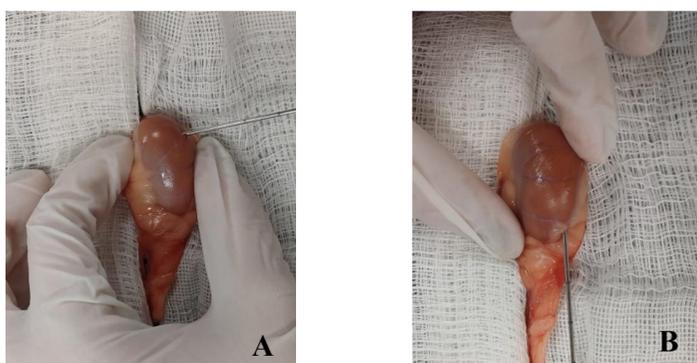


Figure 1: Sample collection for the Tru-cut group. (A) Latero-medial direction of the Tru-cut. (B) Caudo-cranial direction of the Tru-cut.

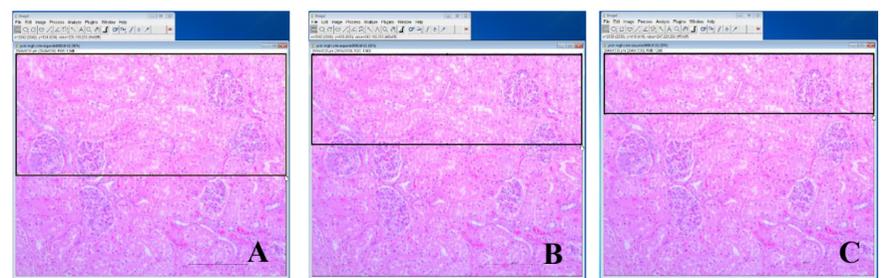


Figure 2: Images related to the virtual biopsy group using Image J software as a tool for glomeruli counting. (A) Nucleus representing the diameter of the Tru-cut 14G caliber. (B) Nucleus representing the diameter of the Tru-cut 16G caliber. (C) Nucleus representing the diameter of the Tru-cut 18G caliber.

DISCUSSION AND CONCLUSION

This study revealed that the lateral kidney region offers the highest visible cortical portion and poses a lower risk of hemorrhage due to reduced medullary tissue penetration, especially when using a caudocranial angle. Renal biopsy with a 16G needle was found to be efficient in maximizing diagnostic quality and minimizing complications, making it the recommended standard for feline renal biopsies.

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