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## **TITLE**

Percutaneous Ultrasound-Guided Kidney Biopsy: A Randomized Controlled Trial Comparing Longitudinal and Cross-Sectional Probe Location Cutting Techniques.

## **BACKGROUND**

Renal biopsy stands as a pivotal intervention for tissue diagnosis in most renal diseases, particularly those affecting the renal parenchyma. Our goal was to compare the efficacy of percutaneous ultrasound-guided renal biopsy using longitudinal and cross-sectional probe location cutting techniques, focusing on the adequacy of tissue sampling and potential complications.

## **METHODS**

In this prospective randomized controlled trial, patients with suspected renal parenchymal disease underwent renal biopsy between August and December 2023. They were randomly assigned to two groups: longitudinal and cross-sectional probe location cutting techniques, consisting of twenty-five patients in each group. We compared the two groups in terms of technical success, defined by the ability to collect more than 10 glomeruli for pathological interpretation, and complications. A subgroup analysis was conducted for each group, specifically examining patients with a thin renal cortex < 10 mm and a BMI above 30. Multivariate analysis with logistic regression was also performed to identify factors predicting technical success.

## **RESULT**

Technical success was achieved in 21 patients (84%) and 16 patients (64%) of the cross-sectional and longitudinal group, respectively, showing no statistical differences ( $p=0.197$ ). There was no significant difference in the median number of collected glomeruli, with 19 glomeruli in each group. Also, no significance was found in terms of complications, including perinephric hematoma, hematuria, and hematocrit level drop ( $p = 0.609$ ). However, 1 patient in the longitudinal group developed hematocrit level drop requiring angioembolization. The result of the subgroup analysis for BMI above 30, including 5 patients in the cross-sectional technique and 6 patients in the longitudinal technique, showed technical success rates of 100% and 33.3%, respectively. Although there was no significant difference in terms of technical success with  $p=0.061$ , there was significance in the mean number of glomeruli of each group, with 17 and 5.8 glomeruli in the cross-sectional and longitudinal approaches, respectively ( $p=0.02$ ). No significant technical success was found in the thin cortex subgroup in terms of technical success and complications, with  $p$ -values of 0.302 and 0.596, respectively. Multivariate analysis with logistic regression, identifying factors predicting technical success, was done and revealed to be cortical thickness with a  $p$ -value of 0.012. The cut point for cortical thickness was further analyzed, revealing a cutoff at 9.2 mm. Cortical thickness above 9.2 mm exhibited a significantly higher chance for technical success, with a sensitivity of 83.7% and specificity of 46.2%.

## **CONCLUSIONS**

Our findings suggest that percutaneous ultrasound-guided renal biopsy using the cross-sectional probe location cutting technique yields better results, particularly in patients with a thin renal cortex and obesity (BMI above 30).

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