

Morphometric Parameters of the Kidney Determined from CT Imaging in a Large Sample of Living Kidney Donors

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Introduction

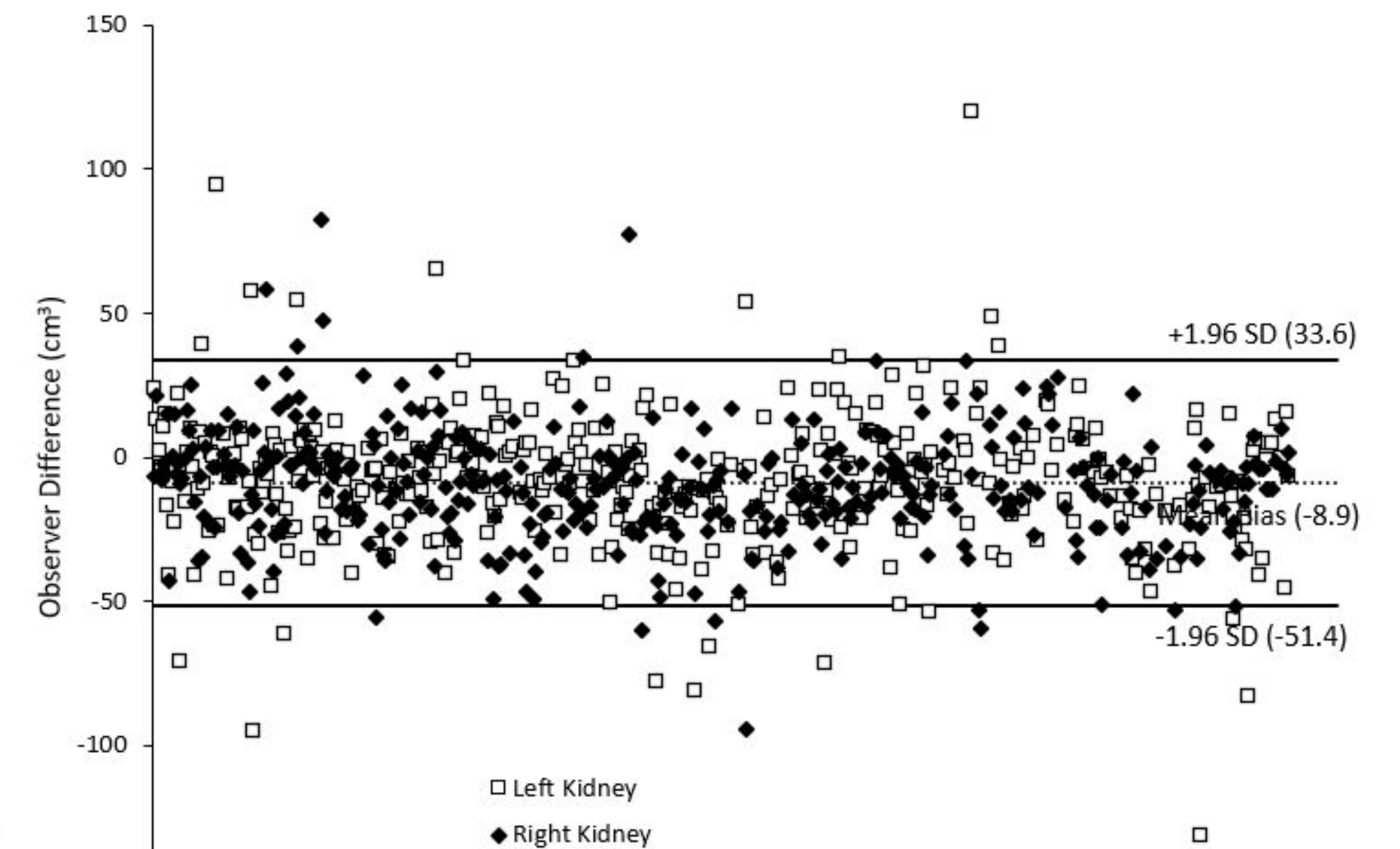
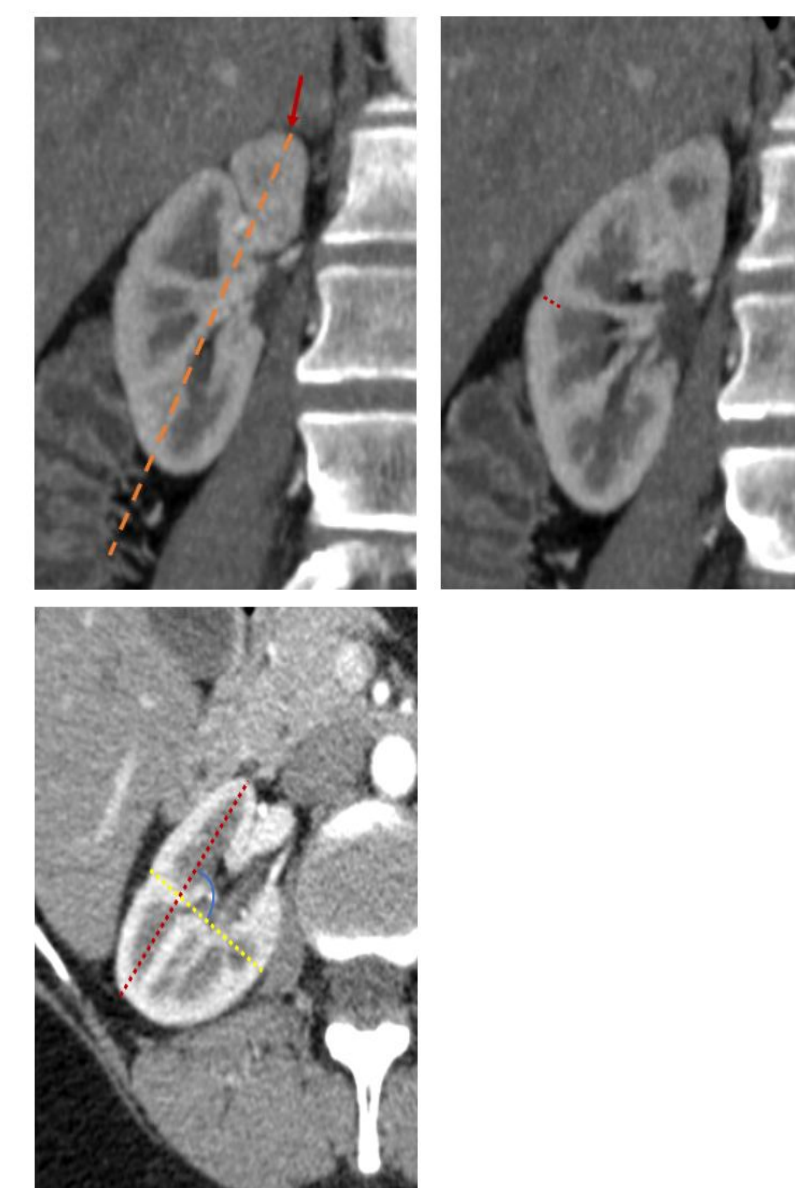
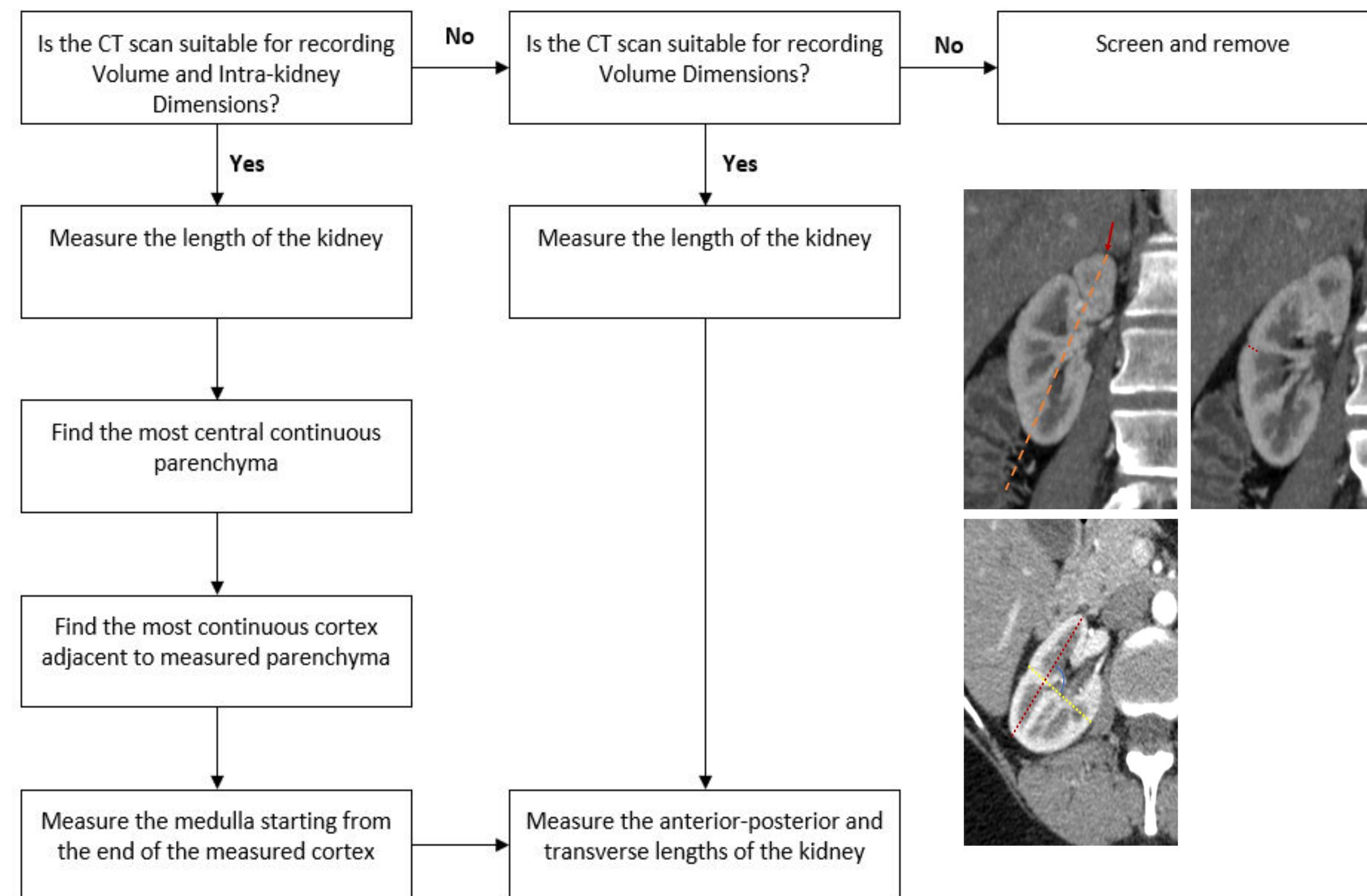
To estimate average kidney morphometric parameters in a large sample of healthy living kidney donors using a simple method based on existing CT images. Existing studies evaluating standard kidney morphometric parameters are limited by small sample sizes. Methods of estimating volume are also tedious and time consuming.

Methodology

Pre-donation CT scans from a sample of 388 living kidney donors from a single centre in Brisbane, Queensland were used in this study. Two independent investigators recorded measurements of the largest coronal, sagittal and transverse diameters of the kidney. Cortical and medullary thickness was also recorded, as was the number of pyramidal structures. Kidney volume was determined using an ellipsoid volume equation. Results were compared between investigators and mean (\pm standard deviation) values were reported descriptively.

Results

Mean volumes of the left and right kidney were $202 \pm 43 \text{ cm}^3$ and $187 \pm 40 \text{ cm}^3$, respectively. Average combined volume was 195 cm^3 . Males tended to have larger kidneys than females (218 cm^3 , $n=175$ and 175 cm^3 , $n=213$, respectively). There was good concordance between the two investigators for estimated kidney volumes (mean difference -8.9 cm^3 , $r^2 = 0.88$). The recorded mean thickness of the cortex and medulla was $6.4 \pm 1.2 \text{ mm}$ and $16.0 \pm 3.0 \text{ mm}$, respectively. The average number of renal pyramids recorded was 6.1 for the right kidneys and 5.6 for the left kidneys.



Conclusions

Our results show that a simple method of measuring kidney dimensions via 2D CT-images can lead to consistent estimates of renal volume. While the results of the two reviewers showed a very high level of precision, more research is required to determine the accuracy of the kidney volume measurements when compared to specialized 3D software that is the gold standard for estimating kidney volume.

This is the largest study to date to expand on the use of the ellipsoid formula to estimate renal volumes using a novel repeatable flowchart method. We found this method to be reliable across observers with a validity that falls within the range of previous literature.