digital radiography was considered the gold standard. All measurements were reported as the maximal diameter in any plane. The threshold for non-inferiority was arbitrarily set at a difference of 7.5%. The mean size difference observed was 0.18 mm between the two techniques, which met the threshold, and thus semiautomatic measurement was non-inferior to manual measurement.

Although it is important to validate these semiautomatic measurements obtained via CT against a gold standard benchmark, a non-inferiority study comparing two different imaging modalities with two different measurement methods is likely not the ideal trial design to answer this question. Despite this significant limitation, the authors detected only <1 mm difference in size between the two imaging modalities, which is clinically insignificant. This suggests that semiautomatic size measurement via CT is accurate. More importantly, this study highlights that CT imaging has value beyond simply stone detection. Leveraging the captured image metadata to semi-automatically calculate clinically relevant stone parameters, such as size and volume will allow clinicians and researchers to better understand the natural history of stone disease and assess the efficacy of available treatment options.

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AUTHOR REPLY

We thank you for your interesting and helpful remarks.

Computed tomography (CT) is indeed nowadays widely accepted as gold standard for diagnosis of urinary stones. Beyond computer assisted software tools for more precise and replicable size estimation, there has been enormous evolution in scan technology over the last years resulting in further substantial reduction in radiation dose.[1] Additionally new dual energy scan techniques allow for direct determination of stone composition.[2] New photon counting detector based CT may further increase radiology performance in the future.[3]

The idea of our study originated due to the mistrust of urologists in the semiautomatic size estimations. Therefore we still consider our methodology of non-inferiority hypothesis as appropriate.

There will be further evolution of radiology imaging of urinary stones, especially ongonig research using dark field imaging seems to be promising for further imaging based stone characterisation.[4] In contrast to the well-known absorption-based imaging, dark-field contrast is generated by diffuse angular deflections of the X-ray wavefront when being scattered at inherent substructures. Since the dark-field signal has been shown to be highly dependent, not only on the chemical composition of imaged samples, but also on the samples morphological structure well below the resolution limit of commonly used imaging detectors it may allow for further discrimination of urinary stone subtypes.[5]

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