Low-tube-voltage 80-kVp neck CT: evaluation of diagnostic accuracy and interobserver agreement


BACKGROUND AND PURPOSE
Low-tube-voltage acquisition has been shown to facilitate substantial dose savings for neck CT with similar image contrast compared with standard 120-kVp acquisition. However, its potential for the detection of neck pathologies is uncertain. Our aim was to evaluate the effects of low-tube-voltage 80-kV(peak) acquisitions for neck CT on diagnostic accuracy and interobserver agreement.

MATERIALS AND METHODS
Three radiologists individually analyzed 80-kVp and linearly blended 120-kVp image series of 170 patients with a variety of pathologies who underwent dual-energy neck CT. Reviewers were unblinded to the clinical indication for CT but were otherwise blinded to any other data or images and were asked to state a final main diagnosis. Findings were compared with medical record charts, CT reports, and pathology results. Sensitivity, specificity, positive predictive value, and negative predictive value were calculated for each observer. Interobserver agreement was evaluated by using intraclass correlation coefficients.

RESULTS
Diagnoses were grouped as squamous cell carcinoma-related (n = 107, presence/absence of primary/recurrent squamous cell carcinoma), lymphoma-related (n = 40, presence/absence of primary/recurrent lymphoma), and benign (n = 23, eg, abscess). Cumulative sensitivity, specificity, positive predictive value, and negative predictive value for 80-kVp and blended 120-kVp images were 94.8%, 93.0%, 95.9%, and 91.1%, respectively. Results were also consistently high for squamous cell carcinoma-related (94.8%/95.3%, 89.1%/89.1%, 94.3%/94.4%, 90.1%/91.0%) and lymphoma-related (95.0%, 100.0%, 100.0%, 95.2%) 80-kVp/120-kVp image series. Global interobserver agreement was almost perfect (intraclass correlation coefficient, 0.82, 0.80; 95% CI, 0.76-0.74, 0.86-0.85). Calculated dose-length product was reduced by 48% with 80-kVp acquisitions compared with the standard 120-kVp scans (135.5 versus 282.2 mGy × cm).

CONCLUSIONS
Low-tube-voltage 80-kVp CT of the neck provides sufficient image quality with high diagnostic accuracy in routine clinical practice and has the potential to substantially decrease radiation exposure.

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