Dual-energy CT pulmonary angiography of pulmonary embolism: comparison of image quality and clot visualisation at 80 kvp, 140 kvp and weighted average images

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Purpose

To quantitatively evaluate enhancement of pulmonary arteries (PA) and visualization of pulmonary clots at different tube voltage settings at dual energy CT (DECT).

Methods and Materials

Sixty-six patients underwent DECT pulmonary angiography (CTPA), which was reconstructed into 80 kVp, 140 kVp, and weighted average 120 kVp images, respectively. CT value of 1st-4th branch of PA, pulmonary clots, and back muscles were measured, corresponding signal to noise ratio (SNR) and contrast to noise ratio (CNR) were calculated. Image quality of CTPA from three groups rated as 1-5 score was visually assessed by two chest radiologists.

Results

There are significant difference for CT value, noise, SNR and CNR of PA enhancement (P<0.001) among three groups; CT value of PA enhancement in 80 kVp images (1st-4th: 446.22±140.48HU, 432.89±129.59HU, 410.57±138.28HU, 391.78±127.45HU) was higher than that of 140 kVp (1st-4th: 243.72±69.55HU, 229.62±63.44HU, 216.40±71.55HU, 204.78±67.88HU) and 120 kVp (1st-4th: 302.91±91.18HU, 290.42±85.01HU, 275.59±85.64HU, 263.32±84.54HU), but with lower CNR (1st-4th: 7.46±2.22, 6.47±1.87, 6.45±2.33, 5.57±2.64) and SNR (1st-4th: 8.34±2.19, 7.25±1.81, 7.31±2.37, 6.35±2.76) than 140 kVp with lowest CNR (1st-4th: 5.54±2.03, 4.67±1.49, 4.93±2.06, 4.12±2.19) and SNR (1st-4th: 6.88±1.99, 5.91±1.44, 6.33±2.07, 5.38±2.42). CNR of pulmonary clots in 80 kVp (8.30±3.26) was higher than that in 140 kVp (5.56±2.24) and 120 kVp (7.98±2.90) (P<0.001). Image quality of CTPA derived from 80 kVp (Kappa=0.789) was superior to that of 140 kVp (Kappa=0.509) and 120 kVp (Kappa=0.652)(P<0.05).

Conclusion

Image quality of 80 kVp is superior to that of weighted average 120 and 140 kVp for visualization of pulmonary clots.
References


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