Establishment of CTPA local diagnostic reference levels with noise magnitude as a quality indicator in a tertiary care hospital

ABSTRACT

This study aimed to establish the local diagnostic reference levels (LDRLs) of computed tomography pulmonary angiography (CTPA) examinations based on body size with regard to noise magnitude as a quality indicator. The records of 127 patients (55 males and 72 females) who had undergone CTPAs using a 128-slice CT scanner were retrieved. The dose information, scanning acquisition parameters, and patient demographics were recorded in standardized forms. The body size of patients was categorized into three groups based on their anteroposterior body length: P1 (14–19 cm), P2 (19–24 cm), and P3 (24–31 cm), and the radiation dose exposure was statistically compared. The image noise was determined quantitatively by measuring the standard deviation of the region of interest (ROI) at five different arteries—the ascending and descending aorta, pulmonary trunk, and the left and right main pulmonary arteries. We observed that the LDRL values were significantly different between body sizes ($p < 0.05$), and the median values of the CT dose index volume (CTDIvol) for P1, P2, and P3 were 6.13, 8.3, and 21.40 mGy, respectively. It was noted that the noise reference values were 23.78, 24.26, and 23.97 HU for P1, P2, and P3, respectively, which were not significantly different from each other ($p > 0.05$). The CTDIvol of 9 mGy and dose length product (DLP) of 329 mGy·cm in this study were lower than those reported by other studies conducted elsewhere. This study successfully established the LDRLs of a local healthcare institution with the inclusion of the noise magnitude, which is comparable with other established references.

Keyword: CT radiation dose; Diagnostic reference level; CT pulmonary angiography; Noise magnitude; Image quality