

ABSTRACT

Thyroid scintigraphy examinations using Single Photon Emission Computed Tomography/Computed Tomography (SPECT/CT) modalities require high image quality for accurate clinical interpretation, but the iterative reconstruction process can cause noise that interferes with the image. This study aims to examine the effect of the number of iterations and the addition of a post-reconstruction Gaussian filter on image quality in Maximum Likelihood Expectation Maximization (MLEM) and Ordered-Subsets Expectation Maximization (OSEM) reconstructions. This study is a retrospective descriptive study analyzing sinogram data from 20 thyroid scintigraphy patients. Image quality was assessed quantitatively from the calculation of the Signal to Noise Ratio (SNR) and Contrast to Noise Ratio (CNR) and qualitatively from the Likert score (three doctors). The results obtained from this study indicate that the number of iterations and post-reconstruction Gaussian filters used in iterative reconstruction can affect image quality. The best image quality in MLEM and OSEM reconstruction without filters was 4 iterations (SNR = 167.91, CNR = 164.06) and 2 iterations (SNR = 92.81, CNR = 91.21). The addition of a post-reconstruction Gaussian filter can improve image quality in MLEM reconstruction with high iterations (30 to 60 iterations) and provide stable image quality in OSEM reconstruction (2 to 60 iterations). MLEM reconstruction requires more time to reach the optimal image quality point, while OSEM reconstruction requires less time, with the optimal point being reached in the early iterations (2 iterations). Therefore, OSEM reconstruction is highly recommended in clinical examinations, and the image quality is still interpretable in clinical examinations.

Keywords: Maximum Likelihood Expectation Maximization (MLEM), Ordered-Subsets Expectation Maximization (OSEM), number of iterations, post-reconstruction Gaussian filter, image quality