

Analisis Penggunaan *Adaptive Statistical Iterative Reconstruction (ASIR)* terhadap Kualitas Citra dan Dosis Radiasi pada *CT Scan Thoraks (Studi Fantom)*

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Abstrak

Penggunaan *Adaptive Statistical Iterative Reconstruction (ASIR)* pada pemeriksaan *CT scan* thoraks telah dilakukan. Penelitian bertujuan untuk menentukan pengaruh penggunaan *ASIR* pada dosis radiasi dan kualitas citra. Penelitian dilakukan menggunakan fantom *anthropomorphic* dan *CT scan GE Optima 580* dengan pengaturan *ASIR* 0%-50%. Penelitian ini juga menggunakan dua parameter: kuat arus tetap dan *tube current modulation (TCM)*. Analisa dosis radiasi dilakukan dengan menghitung nilai $CTDI_{vol}$. Sementara penilaian kualitas citra menggunakan perhitungan *Signal to Noise Ratio (SNR)* dan *Contrast to Noise Ratio (CNR)*. Hasil menunjukkan terdapat perbedaan pada nilai $CTDI_{vol}$ antara pengaturan kuat arus tetap dan *TCM*. Pengaturan kuat arus tetap dengan *ASIR* mulai dari 0% hingga 50% menghasilkan nilai $CTDI_{vol}$ sebagai berikut 48,60 mGy; 43,74 mGy; 38,88 mGy; 34,02 mGy; 29,16 mGy; and 24,30 mGy. Sedangkan $CTDI_{vol}$ pada pengaturan *TCM* dengan *ASIR* 0%-50% yaitu: 21,92 mGy; 20,09 mGy; 18,33 mGy; 16,51 mGy; 14,59 mGy; and 12,75 mGy. Penggunaan kombinasi *ASIR* dengan *TCM* dapat menghasilkan nilai $CTDI_{vol}$ lebih rendah daripada dengan kuat arus tetap. Perbedaan rata-rata nilai $CTDI_{vol}$ antara kedua parameter yaitu 51,80%. Semakin besar persentase pengaturan *ASIR*, semakin besar penurunan nilai $CTDI_{vol}$. Tidak ada perbedaan signifikan pada nilai *SNR* dan *CNR* yang dihasilkan pengaturan *ASIR* 0%-50% dengan kuat arus tetap. Tidak ada perbedaan signifikan pada nilai *SNR* dan *CNR* yang dihasilkan pengaturan *ASIR* 0%-50% dengan *TCM*. Rata-rata nilai *CNR* yang ditunjukkan *TCM* lebih tinggi daripada pada kuat arus tetap

Kata kunci : Adaptive Statistical Iterative Reconstruction (*ASIR*), Tube Current Modulation (*TCM*), $CTDI_{vol}$, Signal to Noise Ratio (*SNR*), Contrast to Noise Ratio (*CNR*)

The Use of Adaptive Statistical Iterative Reconstruction (ASIR) on Image Quality and Radiation Dose in Thorax Ct Scan (Phantom Study)

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Abstract

The use of Adaptive Statistical Iterative Reconstruction (*ASIR*) on *CT scan* of thorax has been investigated. This study aims is to determine the effects of the use of *ASIR* on the radiation dose and image quality. The study was conducted using phantom anthropomorphic using *CT Scan GE Optima 580* with setting *ASIR Dose Reduction* 0%-50%. This study was carried out by using two parameters: fixed tube current and Tube Current Modulation (*TCM*). Analyzing of radiation dose is done by calculation of $CTDI_{vol}$. While image quality are investigated by calculated Signal to Noise Ratio (*SNR*) and Contrast to Noise Ratio (*CNR*). There is a difference in the $CTDI_{vol}$ value, between the fixed tube current and *TCM* settings. At fixed tube current strength, the $CTDI_{vol}$ value is measured, starting from 0% to 50% *ASIR*, respectively: 48,60 mGy; 43,74 mGy; 38,88 mGy; 34,02 mGy; 29,16 mGy; and 24,30 mGy. While the $CTDI_{vol}$ value measured in *TCM* settings uses 0% to 50% *ASIR* as follows: 21,92 mGy; 20,09 mGy; 18,33 mGy; 16,51 mGy; 14,59 mGy; and 12,75 mGy. Using *ASIR* with *TCM* can produce $CTDI_{vol}$ values that are smaller than *ASIR* with fixed tube current.

The difference in the average $CTDI_{vol}$ value is 51.80% between the use of TCM and fixed tube current. The greater the percentage of ASIR regulated, the greater the decrease in the $CTDI_{vol}$ dose. There is no significant difference in the SNR and CNR values produced by 0% to 50% ASIR with a fixed current strength. There is no significant difference in the SNR and CNR values produced by ASIR 0% to 50% with TCM. The average CNR value shown in TCM is higher than that of fixed tube current

Keywords: Adaptive Statistical Iterative Reconstruction (ASIR), Tube Current Modulation (TCM), $CTDI_{vol}$, Signal to Noise Ratio (SNR), Contrast to Noise Ratio (CNR)

Pembimbing Akademik

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