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'DOSE COMPARISON OF TWO IMAGING TECHNIQUES FOR THE DETECTION OF MYELOMA LESIONS'

Introduction

Multiple myeloma (MM) is a hematological malignancy, the activity of which is not clear yet. Skeletal survey and computed tomography are two commonly used imaging techniques for the detection of myeloma lesions.

Purpose

The aim of this study is to compare the effective doses received by patients suspected for MM who were simultaneously evaluated with radiographs and whole body CT (WBCT) scan.

Materials and Methods (1)

10 patients underwent a conventional radiography (CR) and 53 patients underwent a computed tomography (CT) either with filtered back-projection (FBP) or iterative reconstruction (iDose⁴, Philips) algorithm.

Materials and Methods (2)

Concerning CR, seventeen views of human body were obtained and the effective dose (ED) was then estimated utilizing the dose area product (DAP)-to-ED conversion coefficients reported in NRPB-R262 (whole body except for extremities) and NRPB-W4 (for extremities).

Materials and Methods (3)

For the CT examinations, the acquisition and dosimetric data recorded and the ED was estimated by utilizing sex- and age- specific dose length product (DLP)-to-ED conversion factors available in Deak et al. (2010).

Tube Voltage (kV)	Mean Conversion Factors (mSv*mGy ⁻¹ *cm ⁻¹)
80	0.01058
100	0.01050
120	0.01062
140	0.01074

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Results on CR

Projection	Mean kVp	Mean mAs	Mean DAP ($\mu\text{Gy}\cdot\text{m}^2$)	Mean Conversion Factors ($\text{mSv}\cdot\text{Gy}^{-1}\cdot\text{cm}^{-2}$)
Skull AP	78	22.8	61.9	0.0357
Skull Lat	78	22.8	78.7	0.0332
Cervical spine AP	77	13.7	29.9	0.2275
Cervical spine Lat	77	15.7	37.4	0.0343
Chest AP	115	9.5	22.3	0.2793
Chest Lat	115	17.6	122.8	0.141
Right humerus AP	75	13.6	44.0	0.01
Left humerus AP	75	13.7	45.7	0.01
Thoracic spine AP	80	33.3	78.0	0.2334
Thoracic spine Lat	81	43.5	165.2	0.0369
Lumbar spine AP	82	36.7	98.3	0.1141
Lumbar spine Lat	81	44.1	177.2	0.0171
Pelvis AP	82	39.5	290.2	0.2080
Right femur AP	78	23.6	90.3	0.01
Right femur Lat	78	21.9	89.1	0.01
Left femur AP	78	23.6	88.5	0.01
Left femur Lat	78	21.9	83.1	0.01

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Results on CT

Scan data	FBP	iDose ⁴
kVp	117.3 ± 12.4	102.5 ± 6.6
mA	35.8 ± 13.7	25.8 ± 4.9
mAs	67.0 ± 44.4	35.0 ± 12.0
Exposure time (sec)	13.3 ± 1.2	12.9 ± 0.9
Slice thickness (mm)	2.24 ± 0.43	2.00 ± 0.00
CTDI (mGy)	4.76 ± 3.95	1.59 ± 0.72
DLP (mGy*cm)	664.5 ± 575.2	214.4 ± 99.8

Results

The ED of the patients underwent WBCT were 2.33 ± 1.14 mSv and 7.06 ± 6.16 mSv for iDose⁴ and FBP protocols, respectively, while the corresponding ED from the CR procedures were 2.12 ± 0.80 mSv.

Conclusion

Low radiation exposure, almost equal to that of CR, can be achieved with the CT scan when iterative reconstruction algorithm is implemented in the acquisition data.