study amounts to 15 mSv, compared to 12 mSv for 99mTc-MIBI-SPECT stress and rest studies. Conclusion: PET/CTA with ^{15}O-water offers an accurate and fast procedure to evaluate coronary disease. Compared to the regular MIBI-SPECT studies, these water studies offer a higher patient throughput and a more accurate diagnosis.

T15

The additional value of SPECT/CT after iodine based therapy for thyroid cancer and carcinoid

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Aim In cancer patients scheduled to receive therapeutic doses of I-131 (thyroid cancer) or I-131-MIBG (carcinoid) in the Netherlands a planar total body (TB) image is recommended to evaluate tumour uptake. In this study we investigate the additional contribution of SPECT/CT for anatomical localization of the tumour locations and optimal interpretation of planar TB scintigraphy. **Materials and Methods** Sixteen patients (age 22-79) with thyroid cancer (n=14) or carcinoid (n=2) were evaluated. Patients received I-131 dosages between 2.8 and 7.7 GBq. Besides planar imaging, SPECT/CT of neck/thorax and or abdomen was performed 4-7 days after treatment, using a hybrid system (Symbia T, Siemens, Germany). First, each patient was evaluated with planar TB scintigraphy alone. Second, SPECT/CT images corrected for attenuation and scatter were evaluated using orthogonal multiplanar reconstruction. **Results** SPECT/CT images confirmed the uptake seen on the total body images in all cases, and contributed to differentiate physiologic uptake from tumour. SPECT/CT showed additional tumour lesions in 2/16 cases (13%): one rib metastasis and one scapula metastasis. In addition, SPECT/CT improved localization of I-131 uptake foci in 12/16 cases (75%). **Conclusion**SPECT/CT is useful as an additional modality in patients receiving I-131 based therapy. It detects more lesions, improves interpretation of planar scintigraphy, and helps to anatomically localize tumour lesions.

T16

Motion Correction Software in Myocardial Perfusion Imaging: is it Useful?

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Introduction Myocardial Perfusion Imaging (MPI) is a very important tool in the assessment of Coronary Artery Disease (CAD) patients and worldwide data demonstrate an increasingly wider use and clinical acceptance. Nevertheless, it is a complex process and it is quite vulnerable concerning the amount and type of possible artefacts, some of them affecting seriously the overall quality and the clinical utility of the obtained data. One of the most inconvenient artefacts, but relatively frequent (20% of the cases), is related with patient motion during image acquisition. Mostly, in those situations, specific data is evaluated and a decision is made between A) accept the results as they are, considering that the "noise" so introduced does not affect too seriously the final clinical information, or B) to repeat the acquisition process. Another possibility could be to use the "Motion Correction Software" provided within the software package included in any actual gamma camera. The aim of this study is to compare the quality of the final images, obtained after the application of motion correction software and after the repetition of image acquisition. Material and Methods Thirty cases of MPI affected by Motion Artefacts and repeated, were used. A group of three, independent (blinded for the differences of origin) expert Nuclear Medicine Clinicians had been invited to evaluate the 30 sets of three images - one set for each patient - being (A) original image, motion uncorrected, (B) original image, motion corrected, and (C) second acquisition image, without motion. The results so obtained were statistically analysed. Results and Conclusion Results obtained demonstrate that the use of the Motion Correction Software is useful essentially if the amplitude of movement is not too important (with this specific quantification found hard to define precisely, due to discrepancies between clinicians and other factors, namely between one to another brand); when that is not the case and the amplitude of movement is too important, then the percentage of agreement between clinicians is much higher and the repetition of the examination is unanimously considered indispensable.

805 - Monday, October 12, 2009, 11:30 - 13:00, Hall 113

Cardiovascular: methodology

OP221

First Experience with SMARTZOOM Collimation in Clinical Cardiac SPECT

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Aim: We evaluate various imaging protocols using the astigmatic SMARTZOOM collimator (Siemens Medical Solutions, USA, Inc.) with a cardiac centric orbit (CCO) in a clinical cardiac SPECT study. The goal is to develop rapid acquisitions using SMARTZOOM with CCO which yield diagnostic equivalent results compared to the conventional protocol using standard parallel-hole collimators. Methods: Patients are examined using a one-day stress/rest protocol. Typical injected activity is 200-300 MBq (stress) and 800-900 MBq (rest) of Tc-99m Sestamibi. Patients are scanned with our ECG gated acquisition protocol using low energy high resolution (LEHR) collimation on a SPECT/CT Symbia® T6 and CT based attenuation correction with a total scan time of 23 minutes. Additional SPECT acquisitions are done using SMARTZOOM collimation. Total SMARTZOOM acquisition times and orbit ranges vary between 4 and 8 minutes and sub-optimal 180° and 360° of rotation with a cardiac centric orbit (CCO). Data are reconstructed using OSEM-3D including corrections for scatter, attenuation, and SMARTZOOM. Images are blinded and presented to 3 nuclear medicine physicians for a diagnostic comparison read. Individual image scores for the 17 cardiac segments as well as overall scan findings on a 5-step scale from definitely normal to definitely abnormal are recorded. In addition, summed stress scores (SSS) and summed rest scores (SRS) are computed. Ejection fraction (EF) values are determined using 4D-MSPECT. Results: The deviation in overall scan findings on a 5-step scale from definitely normal to definitely abnormal is smaller or equal to one for 10 out of 12 patients, using SMARTZOOM collimation, a 180° CCO with a scan duration of 4 minutes. The mean differences of summed stress and rest scores between the conventional 23 minutes protocol and the 4 minutes 180° SMARTZOOM protocol are 2.44±2.30 and 2.11±1.96. The mean deviation of the ejection fraction is 4%±3%. Pearson correlation coefficients are 0.973 for SSS, 0.971 for SRS and 0.980 for EF. Conclusions: SMARTZOOM collimation with a cardiac centric orbit shows potential in reducing scan time down to 4 minutes in clinical cardiac SPECT resulting in an equivalent diagnosis. The study presents first clinical experiments with SMARTZOOM collimation and a cardiac centric orbit.

OP222

New integrated software for simultaneous analysis of myocardial perfusion SPECT and coronary CT angiography: feasibility study.

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Objectives: The fusion of coronary CT angiography (CTA) with myocardial SPECT will permit to link anatomical lesions to functional defects. Mutual information could improve accuracy and prognostic value of myocardial perfusion SPECT and CTA for detection of coronary artery (CA) disease. The aim of this study was to develop, on Oasis workstation ®, a software for 3D fusion of SPECT/CTA images, CA stenosis identification and perfusion SPECT quantification. **Methods:** The original CTA was first automatically masked to isolate the heart using mathematical morphology. A top-hat method was used to remove large vascular structures from the heart and allow CA enhancement. CA were then segmented with region growing method. After a standard manual CTA reorientation, CA tree and perfusion SPECT were fused and displayed on a polar map and 3D object. CA stenosis was manually identified and CA post-stenosis was highlighted in a relevant color. The software was tested on twelve patients, three healthy and nine with CA disease. Stenosis location was analyzed in comparison with myocardial SPECT defects. **Results:** Masking and automatic CA segmentation (up to first branches) were successfully performed for each patient. The CA tree superimposed with SPECT slices optimized visual interpretation mainly for patients with faint perfusion abnormalities. The fused polar map and 3D object show functional perfusion defects related to the corresponding stenosis location in patients with single vessel disease and more clinically useful with multi vessel disease. **Conclusions:** Providing combined information from myocardial perfusion SPECT and CTA, this new integrated fusion software could optimize detection of coronary artery disease.

OP223

Value of single injection-double acquisition stress gated SPECT before and during low-dose dobutamine infusion for prediction of myocardial perfusion and function improvement after coronary artery bypass graft

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Aims: The assessment of myocardial viability is of critical importance before coronary artery bypass graft (CABG). We used a new protocol single-injection double-acquisition stress gated SPECT (SIDAGS) before and during low-dose dobutamine (LDD) infusion for evaluating contractility reserve as a marker of viability to predict functional improvement after CABG. *Methods:* Twenty nine candidates for CABG referred for assessment of viability underwent stress gated imaging with Tc-99m sestamibi. Immediately after the first stress imaging, an additional gated SPECT was performed during constant infusion of 7.5 µg/kg/min dobutamine. Also, the rest phase images were obtained based on two day protocol. Three months after CABG, myocardial perfusion and function were re-evaluated using a standard stress/rest gated SPECT. Post-CABG improvement of perfusion, left ventricular ejection fraction (LVEF), wall motion (WM) and wall thickening (WT) were considered as gold standard. The percentage of changes in LVEF (%ΔEF) WM (%ΔWM) and WT (%ΔWT) during LDD infusion in SIDAGS protocol were used as the predictive markers of post CABG recovery. Finally, receiver operating characteristic (ROC) analysis was used to identify the value of this protocol in prediction of post-CABG improvement. *Results:* There was a good correlation between post-CABG LVEF improvement and %ΔEF (r=0.64, p=0.002). A %ΔEF equal or more than 10% in SIDAGS protocol may predict more than 5% EF improvement after CABG, with sensitivity of 100% and specificity of 60% (the area under the ROC curve=0.81). There was a good correlation between %ΔWT and improvement of WT after CABG (r=0.61, p=0.001). Any positive %ΔWT can predict post-CABG WT improvement with sensitivity of 73.3% and specificity of 80%. Also the presence of 7 viable segment on SIDAGS can predict at least 6-point decrease in post-CABG summed stress score (SSS), with 100% sensitivity and 60% specificity. *Conclusion*: Due to no need for additional radiotracer injection, reducing cost and radiation exposure to the patients and personnel and shortening the time-length of the study, the proposed SIDAGS protocol seems to be a more valuable in assessment of viability and prediction of post-CABG improvement of myocardial perfusion and function.