Journal of Nuclear Medicine Technology

Volume 34, Issue 4, December 2006, Pages 220-223

Image reconstruction using filtered backprojection and iterative method: Effect on motion artifacts in myocardial perfusion SPECT

Zakavi, S.R.[ac], Zonoozi, A.[a], Kakhki, V.D.[a], Hajizadeh, M.[b], Momennezhad, M.[a], Ariana, K.[a]

[a] Department of Nuclear Medicine, Mashad University of Medical Sciences, Mashad, Iran

[b] Department of Medical Physics, Mashad University of Medical Sciences, Mashad, Iran

[c] Department of Nuclear Medicine, Emam Reza Hospital, Mashad University of Medical Sciences, Mashad, Iran

View references (13)

Abstract

Patient motion during myocardial perfusion SPECT is a common source of errors. The extent and severity of motion artifacts have been described for filtered backprojection (FBP) reconstruction. In recent years, iterative reconstruction has been used increasingly in reconstruction of myocardial perfusion SPECT images and has been shown to be more accurate than FBP even in cases of incomplete datasets. This study evaluated the effect of iterative reconstruction on the extent and severity of motion artifacts. Methods: Six normal, motion-free, and nongated ^{99m}Tc myocardial perfusion SPECT scans were selected, and simulated motion of 3 pixels was applied to the early, middle, and late phases of acquisition in 2 types of movement, returning and non-returning. The images were acquired by a single-head γ-camera in 32 steps at 30 s per step and in a 180° arc from right anterior oblique to left posterior oblique. All original and shifted images were reconstructed using FBP and ordered-subset expectation maximization (OSEM) techniques and interpreted by 2 nuclear medicine specialists qualitatively and semiquantitatively (using 17 segments and a 5-point scoring system). Results: Overall, 68.1% and 70.8% of shifted images were categorized as definitely abnormal in the FBP and OSEM reconstructions, respectively ($P > 0.5$). The mean summed score was 11.9 (±5.7) and 11.3 (±5.2) for nonreturning shifted images ($P = 0.13$) and 5.2 (±2.4) and 3.9 (±2.0) for returning shifted images ($P < 0.001$) in the OSEM and FBP reconstructions, respectively. The incidence of defects in different myocardial segments was similar with the 2 reconstruction methods. The summed score was higher with shifting in the middle phase of acquisition than in the late or early phase. Conclusion: Our study showed that the incidence of abnormal findings and the location of defects were not different between the 2 reconstruction types; however, with semiquantitative assessment, the severity of defects increased with OSEM reconstruction. Although OSEM reconstruction has been reported to be more tolerant to missing data than is FBP reconstruction, our study showed that OSEM reconstruction may be less tolerant to motion artifacts than is FBP reconstruction. Copyright © 2006 by the Society of Nuclear Medicine, Inc.

Reaxys Database Information

|

Author keywords

Filtered backprojection reconstruction; Motion artifacts; Myocardial perfusion SPECT; OSEM reconstruction

Indexed Keywords

EMTREE medical terms: article; artifact; filtered backprojection reconstruction; heart muscle perfusion; image reconstruction; incidence; intermethod comparison; iterative reconstruction; qualitative analysis; scintillation camera; scoring system; simulation; single photon emission computer tomography

ISSN: 00914916 CODEN: JNMTB Source Type: Journal Original language: English

Document Type: Article

View in table layout