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Unexpected findings in SPECT myocardial perfusion imaging

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Introduction

Extra-cardiac findings during MPI acquisition
- 201TI
- 99mTc-labeled radiotracers

Area being viewed
- Patient body size
- Camera field of view
- Thorax
- Upper abdomen

Extra-cardiac uptake accumulations: benign or malignant

Further investigation is required

Potentially life-saving for the patient
Case 1 – Patient History

Male, 73 y.o.
Angina-like symptoms and discomfort under stressful conditions
Episode of chest pain 20 d before MPI study, without ACS findings

Risk factors: CAD FH(+), hypertension, dyslipidemia

- Atrial fibrillation
- Coronary angiography (04.2010): LCx 30%
- Aortic valve replacement (04.2010)
- Mild mitral regurgitation
- Ascending aortic aneurysm

- Subtotal gastrectomy (peptic ulcer)

Medications: Controloc, Olartan, Crestor, Carvedilen, Sintrom, Angoron, Spiriva
Case 1 – Stress/Rest Imaging

β-blocker withdrawal
Treadmill exercise testing (Bruce protocol): maximal, negative

Επιπροβολή έντονης συγκέντρωσης του ρ/φ σε δομή του ΓΕΣ, πλησίον (σχεδόν εφαπτομένης) των τοιχωμάτων του μυοκαρδίου της ΑΡ κοιλίας
Case 1 – Tomography
Case 1 – Chest CT Scan

Non-diagnostic MPI study
Chest CT scan (07.2014): observed radiotracer accumulation linked to GI tract

Υψηλή θέση θόλου στομάχου, πλήρης γαστρογραφίνης
Απουσία χωροκατακτητικής βλάβης
Συσχέτιση με το παλαιότερο ιστορικό υφολικής γαστρεκτομής
Case 2 – Patient History

Male, 42 y.o.
Exertional dyspnea

Risk factors: CAD FH(+), smoking, hypertension, dyslipidemia, obesity

- Lateral wall AMI (2013), thrombolysis
- Coronary angiography (06.2013): LAD 50%, LCx – 2nd obtuse marginal branch 40%

- Left-sided chest wall mass
  Surgery (06.2006) => Biopsy: desmoid tumor of the left breast
  Local recurrence (11.2006) => 2nd surgery, patient referred for RT
  RT (10.2009)

Desmoid tumor of the breast
- Extremely rare, locally aggressive tumor with a tendency to relapse
- Do not have metastatic potential
- Early recognition and wide local excision of the tumor is the treatment of choice

Medications: Efexor, Aldactone, Carvedilen, Crestor, Duoplavin, Belifax
Case 2 – Stress/Rest Imaging / Reinjection

No medication withdrawal
Treadmill exercise testing (Bruce protocol): maximal, positive (↓ST >1mm II, III, aVF, V4-V6)

Εξωκαρδιακή συγκέντρωση ρ/φ στο πρόσθιο τμήμα του ΑΡ ημιθωρακίου και στη σύστοιχη μασχαλιαία χώρα
Πιθανή συσχέτιση με αναφερόμενη χωροκατακτητική εξεργασία και παλαιότερους θεραπευτικούς χειρισμούς στην περιοχή
Case 2 – Tomography

Chest CT scan (07.2015): μάζα εκ μαλακών μορίων (11cm) με υπερκλείδια επέκταση
Discussion

99mTc-labeled radiotracer pathologic uptake

- **Benign / malignant tumors**: parathyroid adenomas, neurofibroma, scapular hibernoma, thyroid cancer, NETs, mediastinal tumors, lung cancer, breast cancer, esophageal carcinoma, lymphoma, Kaposi’s sarcoma, nasopharyngeal cancer, hepatocellular carcinoma, melanoma, sarcomas in the abdomen, multiple myeloma
- **Infectious diseases / non-infectious diseases**: thyroid diseases, benign lymph node hyperplasia, esophagitis, smoker’s lung, lung infections, sarcoidosis

- The mechanism of uptake in non-cardiac lesions is not completely understood, but the size of the lesion, its mitochondrial-rich cellularity and perfusion play a significant role

201Tl pathologic uptake: thymomas, thymic carcinoma, lung cancer, brain cancer, bone cancer, Hodgkin's and non-Hodgkin’s lymphomas, breast cancer, esophageal cancer, most cases of thyroid carcinomas, seminomas

- Thallium uptake by a tumor occurs rapidly in parallel with myocardial uptake
- The similarity in tumor and myocardial 201Tl uptake may indicate that the mechanism of 201Tl uptake by tumor cells is related to a function of blood flow and the Na-K ATPase cell membrane pump (just as for 201Tl myocardial uptake)
Conclusions

• Careful inspection of projection images should be an integral part of interpreting MPI studies.

• According to the literature, various incidental extra-cardiac neck, chest and abdominal abnormalities have been detected.

• Even though MPI is performed for cardiac evaluation, nuclear medicine physicians should be aware of non-cardiac uptake of the radiotracer.

• Any extra-cardiac focal uptake requires attention and has to be mentioned in the report, guiding the referring physician to request further investigation.

• The identification of these coincidental findings is significant for the early detection of the coexisting pathology.

• Particularly, early tumor detection can result in life-saving treatment.
Thank You

Imperial College
London

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2-4/5/2019
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