What is this image? 2019: Image 2 result

Reduction in interfering gastric wall uptake on myocardial perfusion SPECT following a 2-week period of omeprazole withdrawal

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INTRODUCTION

^{99m}Tc-MIBI accumulates non-specifically in a variety of tissues, including organs in close proximity to the heart. These extracardiac activities interfere with the interpretation of myocardial perfusion images. The prolonged use of proton pump inhibitors, e.g., omeprazole, has been demonstrated as a major cause of gastric wall uptake.[1] We present a case with a dramatic effect of withdrawal of omeprazole on gastric wall uptake interfering with the inferior wall of left ventricle (LV).

CLINICAL HISTORY

A 53-year-old woman with an atypical chest pain and a long history of peptic disease presented for SPECT myocardial perfusion imaging. The patient had been on omeprazole for several months. She has no coronary risk factors and was not on any other medications. The physical examination and rest ECG were normal. Dipyridamole SPECT MPI in stress phase demonstrated an intense hot spot at the region of stomach, touching the inferior wall (Figure 1, left panel). Delayed image 2 hours later and drinking a couple of glasses of liquid did not improve the images (Figure 1, middle panel). The study was repeated after omeprazole withdrawal for 2 weeks. A dramatic reduction in gastric uptake was evident (Figure 1, right panel). The stress SPECT images were normal and of higher quality on the repeat images (Figure 2, lower panel vs. upper 2 panels).

DISCUSSION

Myocardial perfusion SPECT using ^{99m}Tc-MIBI, although a useful modality for ischemia investigation, is influenced by a number of technical factors. One of such factors is high activity in the liver or gastrointestinal tract, including stomach. Multiple methods have been introduced to resolve these interfering activities according to the culprit organ and the mechanisms by which the interference occurs. In stomach, either uptake in gastric wall or cavity, the latter as a result of gastroduodenal reflux, could potentially affect the inferior wall of the LV.

Proton pump inhibitors, e.g., omeprazole, but not H2 receptor blocking agents have been investigated in a few studies as agents that stimulate the gastric wall and lead to considerably elevated uptake. The mechanism is not clearly known yet. However, a proposed mechanism is slowing down of washout of ^{99m}Tc-MIBI from mitochondria-rich parietal cells as a result of H^+/K^+ ATPase blockade. Proton pump inhibitors irreversibly block these pumps that transport cationic agents and ^{99m}Tc-MIBI may be treated in a similar fashion. Withdrawal of these drugs for at least 2 weeks has been shown to reduce the interfering hyperactivity as in our patient.[1-3] However, as they are eliminated from plasma with a half-life of about 1 hour and prompt synthesis of newer transporters,[4,5] shorter periods of withdrawal may be equally effective.

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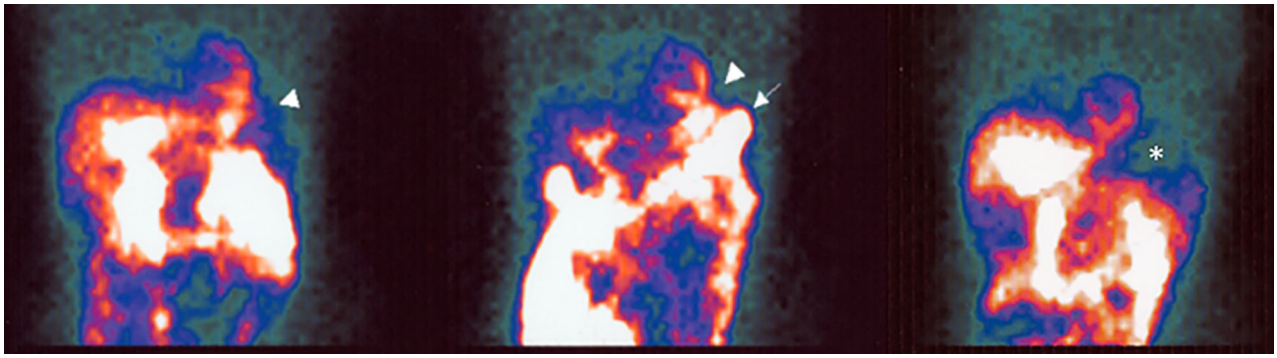

Figure 1. Projections of raw data of early stress (left), delayed stress (middle), and repeat stress after omeprazole withdrawal (right). Intense uptake is detected in region of stomach (shown by arrowheads), almost touching the inferior wall of the LV. The intensity of uptake is even worse in delayed image compared to early image. Activity related to the colon (small arrow) is seen just left to stomach in delayed image. Gastric activity is entirely eliminated in repeat stress projection (asterisk).

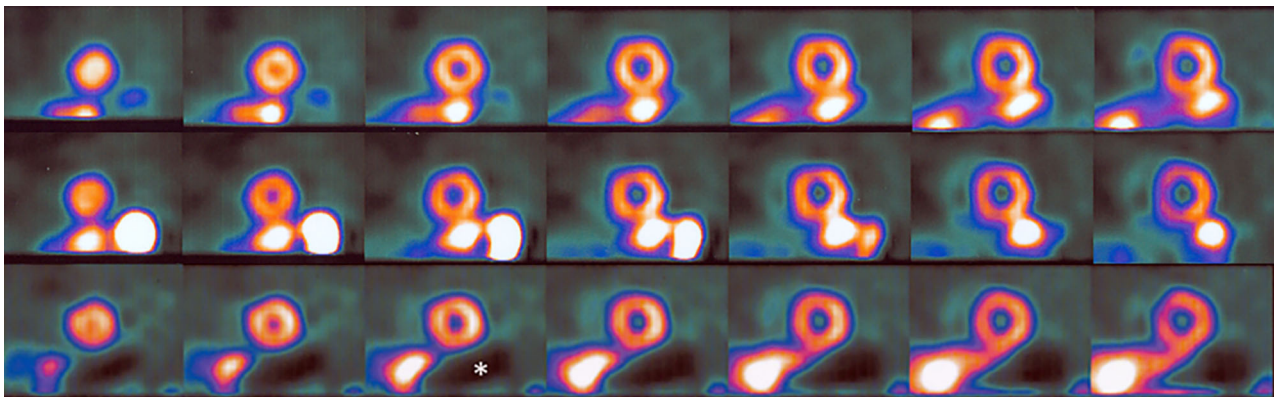

Figure 2. Tomographic slices of early stress (upper row), delayed stress (middle row), and repeat stress after omeprazole withdrawal (lower row). Initial and delayed stress tomographic images show the gastric activity affecting inferolateral wall. The repeat images reveal total elimination of the activity in gastric region and clear images of the LV myocardium.

TEACHING POINTS

- All myocardial perfusion SPECT studies should be assessed technically before interpretation.
- Subdiaphragmatic activities are one of the most frequent interfering problems, which require an appropriate maneuver or strategy to be resolved.
- As the stomach is in close proximity to the inferior wall of the LV, it can produce a variety of artifacts and, therefore, needs a particular attention.
- Proton pump inhibitors like omeprazole can lead to an intense uptake in gastric wall, which is resistant to be resolved by drinking liquid or delayed imaging. A period of drug withdrawal may be beneficial.

FEATURE RESULTS

There were 26 responses of which 4 (15%) were close to the correct answer. These responses included hepatic veins connecting to coronary sinus, biliary Leak, hiatal hernia, adult polycystic kidney disease, myocardial perfusion imaging, planar cardiac scintigraphy using Tc labeled agent (sestamibi), raw tomographic A-SPECT data of the MIBI perfusion SPECT in 3 angles, by-pass gastric, portoenterostomy with residual intrahepatic duct dilatation, biliary leak demonstrated on delayed scan From Tc-99m sestamibi Myocardial Imaging in patient not properly fasting resulting in a lot of gut activity in abdomen, attenuation artifact in the anterior wall of the left ventricle, myocardial perfusion SPECT

raw data, megacolon, fistula gut-biliary tract, uptake in liver and spleen, breast implants, supine and prone images of 99mTc-Sestamibi MPS, rotating image showing LAD infarct.

By draw, the winner is:

Attia Elkheir, MD, from Bab El Oued Hospital, Algiers, Algeria

The winning response was: Images from sestamibi scan (MPI) at different times: image at the left is the initial image after just after the injection where we see liver and gastrointestinal activity that interferes with myocardial activity. Image in the middle we see clearance from liver activity but we still see gut activity that is close to the myocardial activity, the image at the right is done after the stomach has been filled with water or milk which pushes the bowel to the bottom so we have the cardiac activity without gut interference.

Disclosure

The author has no conflict of interest to declare.

References

1. Goel S, Bommireddipalli S, DePuey EG. Effect of proton pump inhibitors and H2 antagonists on the stomach wall in 99mTc-sestamibi cardiac imaging. J Nucl Med Technol 2009;37:240-3.
2. Javadi H, Jallalat S, Semnani S, Mogharrabi M, Nabipour I, Tabib SM, et al. The association of increased stomach wall radiotracer uptake with prolonged use of omeprazole capsules on myocardial perfusion imaging (MPI) using 99mTc-sestamibi SPECT. Nucl Med Rev Cent East Eur 2013;16:91-4.
3. Mouden M, Rijkee KS, Schreuder N, Timmer JR, Jager PL. Influence of proton-pump inhibitors on stomach wall uptake of 99mTc-tetrofosmin in cadmium-zinc-telluride SPECT myocardial perfusion imaging. Nucl Med Commun 2015;36:143-7.
4. Vanderhoff BT, Tahboub RM. Proton pump inhibitors: an update. Am Fam Phys 2002;66:273-80.
5. Der G. An overview of proton pump inhibitors. Gastroenterol Nurs 2003;26:182-90.