Interesting Image
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"Picture-in-Picture" Artifact in Post-therapeutic ^{131}I Whole-body Survey: Deceiving Spot View but Unraveling Whole-body Scanning

Tedavi Sonrası ^{131}I Tüm Vücut Taramada "Resim-İçinde-Resim" Artefaktı: Spot Görüntülemedeki Yanıltıcılığın Tüm Vücut Görüntülemede Ortaya Çıkarılması

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Abstract

Artifacts originated from imaging hardware or instrumentation may be, on some occasions, confusing and peculiar to both physicians and technicians. Various artifacts from a variety of sources have been reported. In this note, we intend to describe a new one with an interesting pattern in whole-body scanning, which is strikingly different from its pattern in static spot view, in a patient presented for post-therapeutic ^{131}I survey after total thyroidectomy.

Keywords: Post-therapeutic ^{131}I survey, "Picture-in-Picture" artifact, whole-body scanning

Öz

Görüntüleme donanımı veya enstrümantasyonundan kaynaklanan artefaktlar, bazı durumlarda kafa karıştırıcı ve hem doktorlara hem de teknisyenlere özgü olabilir. Çeşitli kaynaklardan çeşitli artefaktlar bildirilmiştir. Bu notta, total tiroidektomi ardından tedavi sonrası ^{131}I incelemesi için başvuran bir hastada, tüm vücut taramasında statik spot görünümdeki paterninden çarpıcı şekilde farklı olan ilginç bir paterni tanımlamayı amaçlıyoruz.

Anahtar kelimeler: Tedavi sonrası ^{131}I tarama, "Resim-İçinde-Resim" artefaktı, tüm vücut taraması

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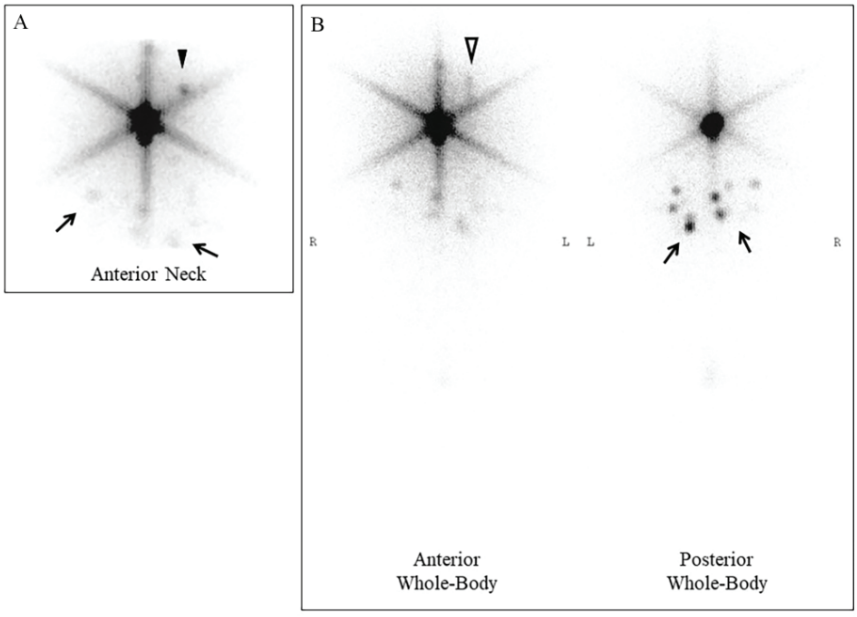

Figure 1. A 40-year-old woman with a recent diagnosis of papillary thyroid carcinoma is referred for radioiodine therapy after undergoing total thyroidectomy. One week later, a post-therapeutic whole-body ^{131}I scan was performed. In static spot view (A), considerable uptake of thyroid tissue remnant was observed in the thyroid bed. Also, a small iodine-avid focus was noticed above and right to the thyroid bed. This finding, initially, gave the impression of a metastatic cervical lymph node (shown by solid arrowhead). However, after performing the anterior whole-body projection (B, left), the mentioned finding is reshaped and transformed to a short vertical line (indicated by open arrowhead), appearing as smudging or smearing of the spot vertically, which makes the diagnosis of a metastatic cervical lymph node less likely. This pattern is in contrast to other active foci scattered in the patient's chest, most prominently visualized in the posterior projection (B, right), which disclose a constant pattern in both spot view and whole-body scanning, attributable to rib metastasis (arrows in A and B, right).

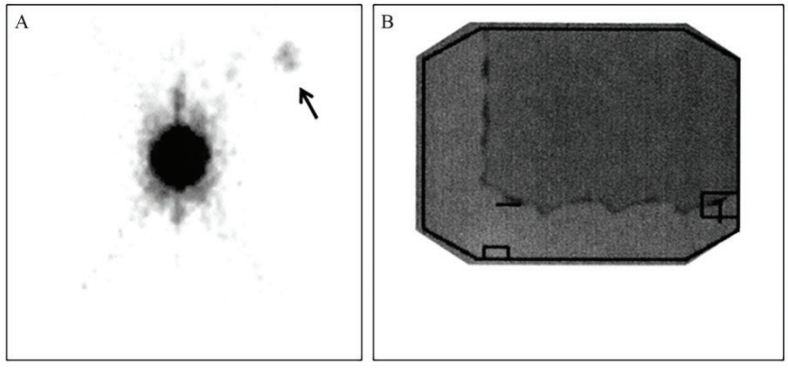

Figure 2. We thought the finding described in Figure 1 could result from the error occurred erratically in the camera in use in our laboratory, which was recognized in other scans performed recently as well (1,2). We, again, carried out quality control testing using a point source placed on the table of the gamma camera. A one-minute image was acquired (A). The static image of the point source revealed a hot spot in the center with its corresponding reproduced image (indicated by arrow) with much less intensity located above and right to the original hot spot, to confirm the pattern which was observed in spot view of the neck. The intrinsic uniformity test performed as a routine weekly task, demonstrated the described pattern in the flood image (B) as a smaller reproduced image superimposed on the right upper corner of the main image. Artifacts from a variety of sources of error may impose serious challenges for interpreting physicians. One such source of error is issues related to imaging instrumentation. Although not occurring very often owing to regular quality control testing in nuclear medicine laboratories, they may be confusing to the interpreter in terms of diversity and complexity of the pattern of artifacts originated from imaging hardware or instrumentation (3,4,5,6). One such artifact with an interesting appearance in nuclear medicine images, is the one which is named and coined as "Picture-in-Picture" artifact. The mechanism by which this artifact occurs lies behind an error in an item of hardware of the gamma camera detector, i.e., digital event processor electronic board, which is responsible for positioning the signals transmitted from photomultiplier tubes. Each event is recorded as a point with values of x and y, in an imaginary Cartesian coordinate system which corresponds point-by-point to a matrix with predefined size in the camera computer memory set by the operator before acquiring images. This process of event localization and positioning does not work properly in this specific flaw of the mentioned electronic board and therefore, the result is a reproduction of the main image. The pattern is particularly striking in images with an intense hot spot against a lower-activity background (1,7).

Ethics

Informed Consent: Written Informed consent was obtained from the patient before performing the scanning.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Concept: M.Q., Design: M.Q., R.A., Data Collection or Processing: M.Q., R.A., Analysis or Interpretation: M.Q., R.A., Literature Search: M.Q., R.A., Writing: M.Q., R.A.

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