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Enchondroma of tibia as potential false-positive finding on ^{68}Ga -DOTATOC PET/CT scan.

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Abstract

A 70-year-old man with history of carcinoid tumor of small bowel, was referred for ^{68}Ga -DOTATOC study to evaluate the extent of disease. PET/CT scan revealed known metastatic disease in liver, with other sites of involvement including pancreas, peritoneum and bones. In addition, moderately intense uptake was noted in proximal right tibia and further correlation on CT showed metaphyseal lesion with ‘rings and arcs’ calcification suggestive of enchondroma. This case highlights the possibility of overexpression of somatostatin receptors in enchondromas, which has been little explored in literature.

Keywords

Enchondroma; ^{68}Ga -DOTATOC; DOTATOC; carcinoid; somatostatin receptors; benign; false positive; PET

This case highlights the possibility of overexpression of somatostatin receptors in enchondromas, which has been little explored in literature. Somatostatin receptors are G-protein coupled receptors, physiologically present on the membrane of neuroendocrine cells, for example in the pituitary or the adrenals, and generally over-expressed in neuroendocrine tumor lesions. This property has made the success of radiolabeled somatostatin analogues, such as ^{68}Ga -DOTATOC, for the PET/CT based visualization and management of neuroendocrine tumors (NET), due to their high sensitivity and specificity [1–3].

Areas of uptake outside the sites of physiological accumulation should be regarded as potentially malignant. Semiquantitative measurements such as SUVmax or tumor to non-tumor ratio are used to measure the uptake of lesions and to compare these values in restaging, and, in some cases, they have been proposed to distinguish physiologic from malignant uptake, for example in the head of the pancreas [4]. This approach, however, is controversial [5] and experience, correlation with findings on companion CT or correlative imaging (e.g. MR), rather than intensity of uptake are a better guide for a correct interpretation of the findings [6].

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“False positive” uptake, relative to oncologic staging, has been described in areas of infection/inflammation, due to the expression of somatostatin receptors in lymphocytes. Examples include arthritis, post-surgical inflammation, granulomas [7]. Other tumors can also show variable degrees of somatostatin receptor expression, including meningiomas, fibroadenoma and vertebral hemangiomas [8–10]. Such conditions may constitute incidental findings at Ga-SSA PET/CT and may complicate the interpretation of the images [6].

Enchondromas are common, comprising up to 15% of all benign bone tumors found on imaging [11]. They are painless with imaging features of endosteal scalloping less than two-third cortical thickness, absence of periosteal reaction or cortical breakthrough, and no associated soft tissue masses [12]. They can be seen in medullary cavity of any bone and are result of enchondral ossification. Malignant transformation of enchondromas to chondrosarcoma is well known and differentiation of benign enchondroma from low grade chondrosarcoma is often difficult [13]. Limited literature is available to understand the expression of somatostatin receptors on enchondromas. Our case has limitation of lacking pathological correlation; although radiological features are highly suggestive of benign disease. To our knowledge, this is a unique report highlighting false positive uptake of ^{68}Ga -DOTATOC in long bone enchondroma and suggests presence of somatostatin receptors on these bone lesions. Recognition of benign lesions that express somatostatin receptors will be helpful in interpretation of ^{68}Ga labelled somatostatin receptor PET/CT images and not all non-physiological DOTA activity should be attributed to neuroendocrine tumor disease.

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Figure 1.

A 70-year-old man with h/o ileal carcinoid tumor, was referred for ^{68}Ga -DOTATOC study.

(**A; MIP image**) Whole-body scan demonstrated physiological ^{68}Ga -DOTATOC accumulation in pituitary gland, spleen, liver, adrenals, kidneys, bladder, stomach, and bowel. Foci of increased uptake were noted in the abdomen localizing to (**B; fused PET/CT and C; CT axial, *thin white arrows***) small subcapsular and intrahepatic lesions (SUV 4.4 – 8.1), and in the (**D; fused PET/CT and E; CT axial, *thick arrow***) costovertebral region of right 12th rib (SUV 16.0). Additional disease included a focus in the tail of pancreas and a small peritoneal nodule. Incidental focal uptake was noted in the proximal right tibia (**A, *black arrow***) SUV 4.2.

Figure 2. (A, B) Coronal, (C) sagittal and (D) axial sections of fused PET/CT and CT images (*white arrows*) showed focal ^{68}Ga -DOTATOC uptake in the right proximal tibial metaphysis, corresponding to a well-defined lesion with characteristic 'rings and arcs' calcification on CT, suggestive of enchondroma.