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Bladder Crystal Formation shown as false positive cause in F-18 Fluorodeoxyglucose (FDG) Positron Emission Tomography/Computed Tomography (PET/CT)

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Abstract

Introduction: There are some false positivity reasons for the bladder in FDG PET/CT. This case report demonstrates one of these causes which were not reported before.

Case and outcomes: A male patient sixty-five years of age with known diagnosis of metastatic colon carcinoma receiving chemotherapy treatment referred for follow up FDG PET/CT which showed partial metabolic response and suspicious calcified lesion in the bladder wall with significant FDG accumulation. Cystoscopy and pathology results demonstrated crystal formation and adjacent inflammation as an explanation.

Discussion: The FDG accumulations due to foreign materials have been reported in elsewhere in the body before in the literature. This accumulation in this case may represent foreign body reaction.

Conclusion: This case report showed an interesting false positive lesion demonstrated firstly in the literature as far as we know. The follow up results confirmed that the FDG accumulation in the bladder was a false positive.

1. Introduction

In case of observation of calcified lesion with significant FDG uptake in bladder one of the important differential diagnoses is osseous metaplasia and the second is sarcomatoid carcinoma according to literature (1, 2). Especially if the patient received previous radiation therapy to the pelvic region for another malignant tumor; radiation induced sarcoma may be suspected (3). In this present case we observed progressive FDG accumulating calcified bladder mass in follow up PET/CT scan with pathologic diagnosis of the crystal formation (4).

2. Case Report:

Sixty-five years of age male patient was referred to the hospital with known diagnosis of colon cancer. The patient had anamnesis of previous radiation therapy to the pelvic region for the rectum carcinoma. The patient was referred for FDG PET/CT study for chemotherapy response evaluation. The F-18 FDG PET/CT study was performed by approximately 14.5 mCi (536 MBq) intravenous injection of F-18 FDG after 10 hour fasting period. The imaging was performed approximately 1 hour after administration of the radiopharmaceutical in craniocaudal direction. PET/CT imaging showed the hypermetabolic mass in sigmoid colon, and additional multiple liver lesions with significant FDG uptake. The complete remission of the malignancy was achieved by ongoing chemotherapy shown after five months follow up PET/CT as well as increased FDG accumulation in the calcified bladder lesion (Figure 1). Correlation with cystoscopy and pathology results revealed crystal formation with additional inflammation without malignancy (Figure 2). The patient died in two month follow up after PET/CT during the disease course.

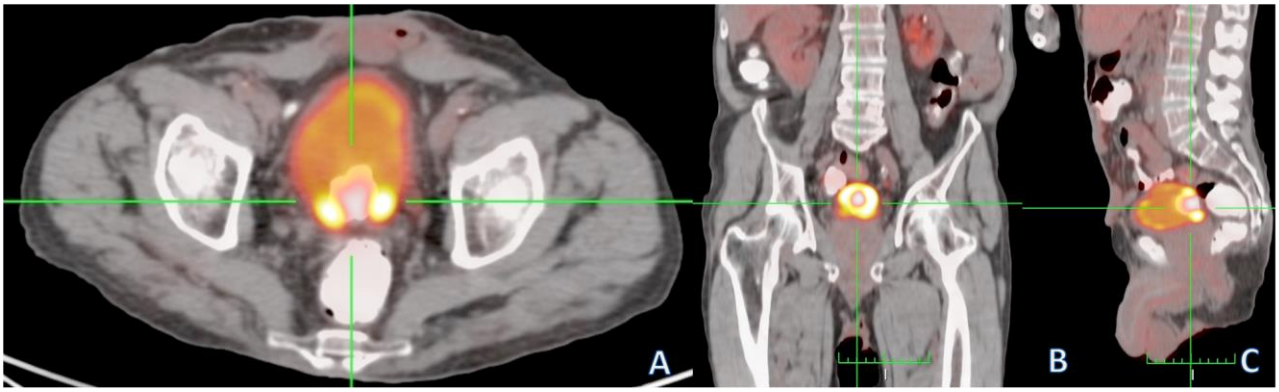

Figure 1: Sagittal, Coronal and Transaxial fusion PET/CT images of the calcified bladder lesion with significant adjacent FDG accumulation.

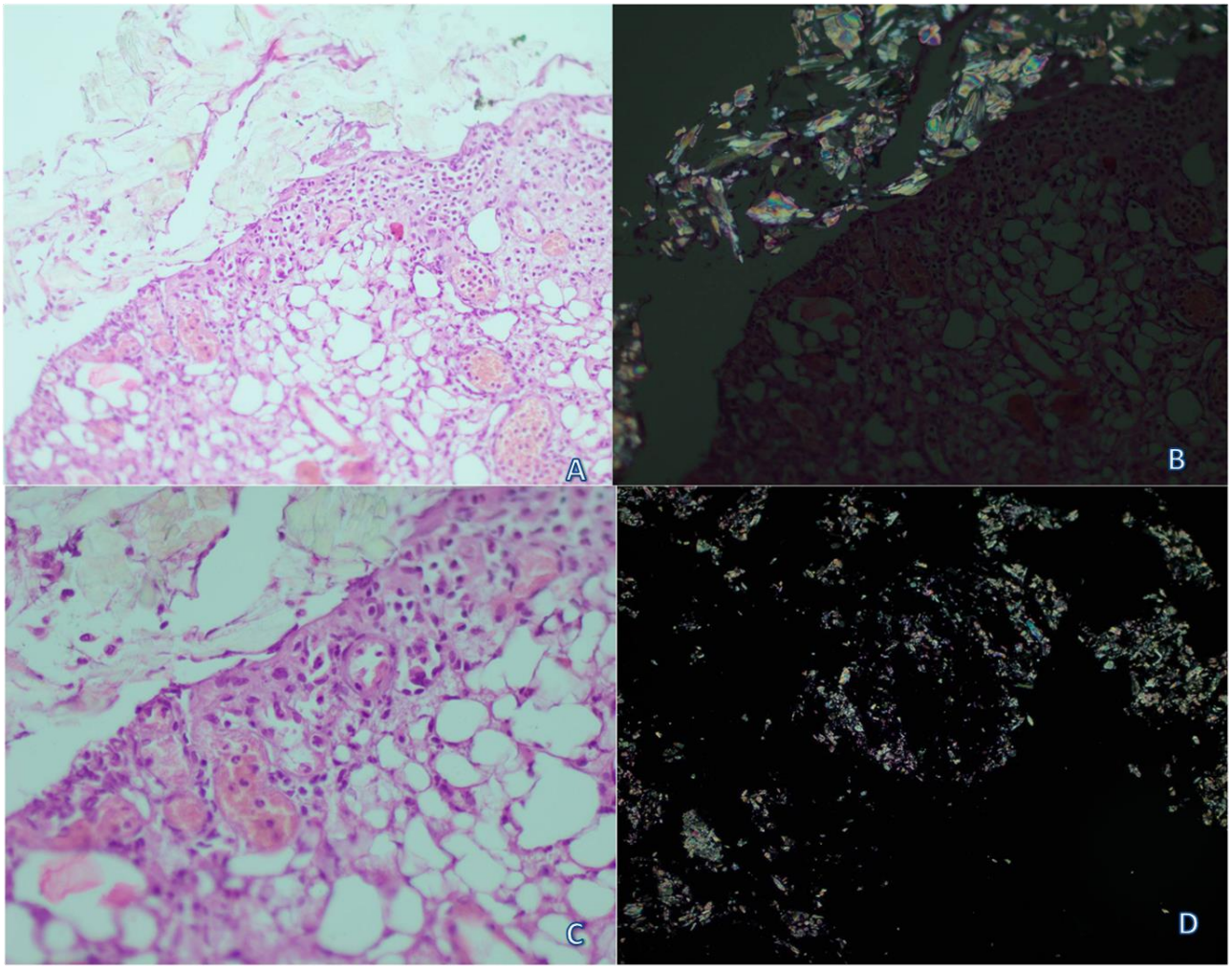

Figure 2: Pathology images of the lesion.

3. Discussion

In previous case reports it has been shown that incidental detection of the bladder tumors is possible by means of FDG PET/CT studies for other oncologic purposes as primary bladder carcinoma or other tumors including lymphoma or neuroendocrine carcinoma (4, 5). The FDG PET/CT is the first choice imaging modality in staging and treatment response evaluation for the patients with colon carcinoma. Other radionuclide imaging modalities; Technetium 99m (Tc-99m) bone scintigraphy or F-18 Fluoromethylcholine (FCH) PET/CT might show metachronous bladder tumor as well (6, 7). In a previous case report incidental detection of a bladder carcinoma as FDG avid lesion in the bladder was reported during the imaging of another known malignancy (8).

Although it is problematic to evaluate the primary bladder tumors in FDG PET/CT due to high background urine activity, late phase imaging with additional diuretic administration increased the rate of determination of the primary tumor in the bladder. However, FCH which has lower urinary excretion is preferred in the staging of prostate cancer (7). C-11 choline PET was also performed for the detection of bladder lesions but has limitations due to inflammatory reactions and in determination of the small sized lesions (9, 10).

Radionuclide imaging studies can unexpectedly demonstrate secondary malignancies especially in the bladder thus may provide early detection. However, there are false positive causes as diverticulitis of the bladder. The role of FDG avid inflammation is well known and the FDG uptake in this case was probably due to adjacent inflammation in this case. FDG is the ideal radioisotope in follow up of the patients with metastatic colon carcinoma however presents same difficulties for bladder image interpretation. In this case false positive results in a calcified bladder mass with increased FDG accumulation is reported.

Conflict of Interest

The authors declared no conflict of interest.

References

1. Boudabbous, S., Arditi, D., Paulin, E., Koessler, T., Rougemont, A. L., & Montet, X. (2015). Ossifying metaplasia of urothelial metastases: original case with review of the literature. *BMC medical imaging*, *15*, 30. https://doi.org/10.1186/s12880-015-0072-1

2. Cormio, L., Sanguedolce, F., Massenio, P., Di Fino, G., Selvaggio, O., Bufo, P., & Carrieri, G. (2014). Osseous metaplasia within a urothelial bladder cancer nodal metastasis: a case report. *Analytical and quantitative cytopathology and histopathology*, *36*(2), 117–119.

3. Gladdy, R. A., Qin, L. X., Moraco, N., Edgar, M. A., Antonescu, C. R., Alektiar, K. M., Brennan, M. F., & Singer, S. (2010). Do radiation-associated soft tissue sarcomas have the same prognosis as sporadic soft tissue sarcomas? *Journal of clinical oncology : official journal of the American Society of Clinical Oncology*, *28*(12), 2064–2069. https://doi.org/10.1200/JCO.2009.25.1728.

4. Mantzarides, M., Papathanassiou, D., Bonardel, G., Soret, M., Gontier, E., & Foehrenbach, H. (2005). High-grade lymphoma of the bladder visualized on PET. *Clinical nuclear medicine*, *30*(7), 478–480. https://doi.org/10.1097/01.rlu.0000167482.23562.ab.

5. Treglia, G., Bongiovanni, M., & Giovanella, L. (2014). A rare case of small cell neuroendocrine carcinoma of the urinary bladder incidentally detected by F-18-FDG PET/CT. *Endocrine*, *45*(1), 156–157. https://doi.org/10.1007/s12020-013-9995-x.

6. Lin Y, Lu YY, Wang HY, Tsai SC. & Lin WY. (2013). Accidental finding of bladder cancer in 99mTc methylene diphosphonate whole-body bone scan. ClinNucl Med. 38(8), 643-5.

7. Parekh, A., Hagan, I., Capaldi, L., & Lyburn, I. (2017). Incidental Papillary Bladder Carcinoma on 18F-Fluoromethylcholine PET/CT Undertaken to Evaluate Prostate Malignancy. *Clinical nuclear medicine*, *42*(9), 721–722. https://doi.org/10.1097/RLU.0000000000001754.

8. Osman, M. M., Altinyay, M. E., Abdelmalik, A. G., Brickman, T. M., Varvares, M. A., & Nguyen, N. C. (2011). FDG PET/CT incidental diagnosis of a synchronous bladder cancer as a fourth malignancy in a patient with head and neck cancer. *Clinical nuclear medicine*, *36*(6), 496–497. https://doi.org/10.1097/RLU.0b013e318217393f.

9. De Jong, I. J., Pruim, J., Elsinga, P. H., Jongen, M. M., Mensink, H. J., & Vaalburg, W. (2002). Visualisation of bladder cancer using (11)C-choline PET: first clinical experience. *European journal of nuclear medicine and molecular imaging*, *29*(10), 1283–1288. https://doi.org/10.1007/s00259-002-0881-7.

10. Tahara, T., Ichiya, Y., Kuwabara, Y., Otsuka, M., Miyake, Y., Gunasekera, R., & Masuda, K. (1989). High [18F]-fluorodeoxyglucose uptake in abdominal abscesses: a PET study. *Journal of computer assisted tomography*, *13*(5), 829–831. https://doi.org/10.1097/00004728-198909000-00014.

11. De Jong, I. J., Pruim, J., Elsinga, P. H., Jongen, M. M., Mensink, H. J., & Vaalburg, W. (2002). Visualisation of bladder cancer using (11)C-choline PET: first clinical experience. *European journal of nuclear medicine and molecular imaging*, *29*(10), 1283–1288. https://doi.org/10.1007/s00259-002-0881-7.