Published in final edited form as:

Clin Nucl Med. 2015 October ; 40(10): 819–820. doi:10.1097/RLU.0000000000000807.

“Talc Pleurodesis with intense 18F-FDG activity but no 68Ga-DOTA-TATE activity on PET/CT”

Georgios Z. Papadakis, MD^a, Corina Millo, MD^b, Ulas Bagci, PhD^{a,c}, Nicholas J. Patronas, MD^a, and Constantine A. Stratakis, MD, D(med)Sci^d

^a Radiology and Imaging Sciences, Warren Grant Magnuson Clinical Center (CC), National Institutes of Health (NIH), Bethesda, MD 20892, USA.

^b Division of Nuclear Medicine, RAD&IS; Clinical Center, National Institutes of Health (NIH), Bethesda, MD20892,USA.

^c Center for Research in Computer Vision (CRCV), University of Central Florida, Orlando, FL 32816, USA.

^d Section on Endocrinology and Genetics, Program on Developmental Endocrinology & Genetics, Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Health (NIH), Bethesda, MD 20892,USA.

Abstract

Talc pleurodesis (TP) is a technique, widely employed in the management of patients with persistent pleural effusions or pneumothoraces not amenable to other treatment options. It is well documented, that talc deposits produce areas of highly increased 18F-FDG uptake, due to talc-induced inflammation. We present a case of a patient with history of TP who was evaluated with both 18F-FDG and 68Ga-DOTA-TATE. The hypermetabolic area seen on 18F-FDG-PET-CT in the region of talc placement, showed no uptake by 68Ga-DOTA-TATE, suggesting the potential role of 68Ga-DOTA-TATE-PET-CT in elucidating 18F-FDG-positive lesions in patients with history of both neuroendocrine malignancy and TP.

REFERENCES

1. Kennedy L, Sahn SA. Talc pleurodesis for the treatment of pneumothorax and pleural effusion. *Chest.* 1994; 106:1215–1222. [PubMed: 7924497]
2. Kolschmann S, Ballin A, Gillissen A. Clinical efficacy and safety of thorascopic talc pleurodesis in malignant pleural effusions. *Chest.* 2005; 128:1431–1435. [PubMed: 16162739]
3. Weissberg D, Ben-Zeev I. Talc pleurodesis. Experience with 360 patients. *J Thorac Cardiovasc Surg.* 1993; 106:689–695. [PubMed: 8412264]

Corresponding author and Request for Reprints Contact Information: *Constantine A. Stratakis, MD, D(Med)Sc*, Scientific Director, Eunice Kennedy Shriver National Institute of Child Health & Human Development (NICHD), Chief, Section on Endocrinology & Genetics (SEGEN), PDEGEN, NICHD & Director, Inter-Institute Pediatric Endocrinology Program, NIH, Building 10, CRC, Room 1-3330, 10 Center Dr., MSC1103, Bethesda, Maryland 20892, tel.. 301-496-4686/496-6683, fax 301-402-0574/480-0378, stratak@mail.nih.gov.

Disclosure: All authors have nothing to disclose

4. Malthlouthi A, Chabchoub A, Labbene N, et al. An experimental anatomicopathological study of pleural talcosis. *Rev Mal Respir.* 1992; 9:617–621. [PubMed: 1470754]
5. Rodriguez-Panadero F, Montes-Worboys A. Mechanisms of pleurodesis. *Respiration.* 2012; 83:91–98. [PubMed: 22286268]
6. Murray JG, Erasmus JJ, Bahtiarian EA, et al. Talc pleurodesis simulating pleural metastases on 18Ffluorodeoxyglucose positron emission tomography. *AJR.* 1997; 168:359–360. [PubMed: 9016206]
7. Weiss N, Solomon SB. Talc pleurodesis mimics pleural metastases. Differentiation with positron emission tomography/computed tomography. *Clin Nucl Med.* 2003; 28:811–814. [PubMed: 14508271]
8. Kwek BH, Aquino SL, Fischman AJ. Fluorodeoxyglucose positron emission tomography and CT after talc pleurodesis. *Chest.* 2004; 125:2356–2360. [PubMed: 15189963]
9. Nguyen M, Varma V, Perez R, et al. CT with histopathologic correlation of FDG uptake in a patient with pulmonary granuloma and pleural plaque caused by remote talc pleurodesis. *Am J Roentgenol.* 2004; 182:92–94. [PubMed: 14684519]
10. De Weerd S, Noppen M, Everaert H, et al. Positron emission tomography scintigraphy after thorascopic talcage. *Respiration.* 2004; 71:284. [PubMed: 15133349]
11. Al-Sarraf N, Doddakula K, Wedde T, et al. Positron emission tomography staging of pleural deposits following Monaldi's procedure: an accurate reflection or a false staging? *Interact CardioVasc Thorac Surg.* 2007; 6:260–261. [PubMed: 17669837]
12. Ahmadzadehfara H, Palmedoa H, Strunkb H, et al. False positive 18F-FDG PET/CT in a patient after talc pleurodesis. *Lung Cancer.* 2007; 58:418–421. [PubMed: 17624474]
13. Hemdan Abdalla AM, White D. A 29-yearold woman with a remote history of osteosarcoma and positron emission tomography positive pleurally based masses. Talcomas secondary to prior talc pleurodesis. *Chest.* 2008; 134:640–643. [PubMed: 18779200]
14. Nguyen NC, Tran I, Hueser CN, et al. F-18 FDG PET/CT characterization of talc pleurodesis-induced pleural changes over time: a retrospective study. *Clin Nucl Med.* 2009; 34:886–890. [PubMed: 20139823]
15. Peek H, van der Bruggen W, Limonard G. Pleural FDG uptake more than a decade after talc pleurodesis. *Case Reports in Medicine.* 2009; 2009:650864. [PubMed: 19724640]
16. Tenconi S, Luzzi L, Paladini P, et al. Pleural granuloma mimicking malignancy 42 years after slurry talc injection for primary spontaneous pneumothorax. *Eur Surg Res.* 2010; 44:201–203. [PubMed: 20523052]
17. Genestreti G1, Moretti A, Piciucchi S, et al. FDG PET/CT Response Evaluation in Malignant Pleural Mesothelioma Patients Treated with Talc Pleurodesis and Chemotherapy. *J Cancer.* 2012; 3:241–245. [PubMed: 22670158]
18. Fanggiday JC, Rouse RW, Collard SM, et al. Persistent Inflammation in Pulmonary Granuloma 48 Years after Talcage Pleurodesis, Detected by FDG-PET/CT. *Case Rep Med.* 2012; 2012:686153. [PubMed: 23251181]
19. Vandemoortele T, Laroumagne S, Roca E, et al. Positive FDG-PET/CT of the pleura twenty years after talc pleurodesis: three cases of benign talcoma. *Respiration.* 2014; 87:243–248. [PubMed: 24457915]
20. Amarante MP, Younes RN, Rigo L, et al. Interpretation of PET/CT findings in patients with advanced lung cancer who have undergone pleurodesis. *Ecancermedalscience.* 2014; 8:452. [PubMed: 25183997]
21. Dalm VA, van Hagen PM, van Koetsveld PM, et al. Expression of somatostatin, cortistatin, and somatostatin receptors in human monocytes, macrophages, and dendritic cells. *Am J Physiol Endocrinol Metab.* 2003; 285:E344–E353. [PubMed: 12684217]
22. Armani C, Catalani E, Balbarini A, et al. Expression, pharmacology, and functional role of somatostatin receptor subtypes 1 and 2 in human macrophages. *J Leukoc Biol.* 2007; 81:845–855. [PubMed: 17148691]
23. Rominger A, Saam T, Vogl E, et al. In vivo imaging of macrophage activity in the coronary arteries using 68Ga-DOTATATE PET/CT: correlation with coronary calcium burden and risk factors. *J Nucl Med.* 2010; 51:193–197. [PubMed: 20080898]

24. Virgolini I, Ambrosini V, Bomanji JB, et al. Procedure guidelines for PET/CT tumour imaging with ^{68}Ga -DOTA-conjugated peptides: ^{68}Ga -DOTA-TOC, ^{68}Ga -DOTA-NOC, ^{68}Ga -DOTA-TATE. *Eur J Nucl Med Mol Imaging*. 2010; 37:2004–2010. [PubMed: 20596866]

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

FIGURE.

A 51-year-old female with history of multiple endocrine neoplasia type 1 (MEN-1) underwent resection of an anterior mediastinal mass, which was histologically proven to be a WHO type B3, Masaoka stage III thymoma. Postoperatively, the patient developed right-sided chylothorax, which was initially treated with chest tube, octreotide therapy and low fat diet in order to decrease chyle fluid production. Due to recurrent pleural fluid, the patient underwent thoracic duct ligation via VATS (Video-Assisted Thoracoscopic Surgery) and TP, which resulted in resolution of her chylothorax. Repeated follow-up 18F-FDG-PET/CT studies, showed intensely increased uptake (SUVmax: 27.5), in the posterior right cardiophrenic angle (Figure 1a:18F-FDG-PET coronal image, 1b:18F-FDG-PET/CT coronal image), corresponding to pleural thickening seen on CT (Figure 1c: CT coronal image). Based on the patient's history of talc placement in this specific region, the increased 18F-FDG uptake was attributed to talc-induced inflammation. On follow-up two years after TP, both 18F-FDG-PET/CT and 68Ga-DOTA-TATE-PET/CT studies were performed. Once again 18F-FDG-PET/CT showed increased hypermetabolic activity (SUVmax: 26.0) in the region of talc-placement, whereas PET/CT using 68Ga-DOTA-TATE showed no uptake (Figure 1d:68Ga-DOTA-TATE-PET/CT coronal image). Talc pleurodesis is an established, highly efficient technique for the treatment of patients with persistent benign or malignant pleural effusions, recurrent pneumothoraces, and persistent bronchopleural fistulas [1-3]. Pathologic studies have shown the acute development of both visceral and parietal pleural granulomatous inflammation with intensive proliferation of fibroblasts, following talc administration. Subsequently, collagen production and formation of strong adhesive links between the visceral and parietal pleural surfaces, leads to pleural fibrosis and obliteration of the pleural space [1,4,5]. It is well established [6-20], that talc deposits in the pleura produce areas of increased 18F-FDG uptake, for up to 48 years after the performance of TP [18]. Distinguishing pleural malignancy from talc-induced benign inflammatory changes is challenging by 18F-FDG, especially in patients with history of both thoracic malignancy and TP. This diagnostic dilemma becomes even greater, when pulmonary parenchymal nodules develop, due to talc-particle absorption through the pleura, with avid 18F-FDG uptake [9]. Since, 18F-FDG is not a malignancy-specific agent, the use of 18F-FDG-PET/CT imaging can lead to misinterpretation and false upstaging in patients with history of TP. It has been reported that somatostatin receptors (SSTRs) are expressed and upregulated on human macrophages [21-23], suggesting the potential role of PET/CT using 68Ga-DOTA-conjugated peptides (SST analogues) for evaluation of sites of talc-induced inflammation. To our knowledge, we present the first report of a patient with history of TP who underwent PET/CT using 68Ga-DOTA-TATE, which has a predominant affinity for SSTR subtype 2. There was no 68Ga-DOTA-TATE uptake (Figure 1d) by the corresponding hypermetabolic area, indicating lack of SSTRs expression at sites of chronic talc-induced inflammation. On

the other hand, the majority of neuroendocrine tumors (NETs) overexpress SSTRs, and can be effectively targeted and localized using radiolabelled SST analogues [24]. Thus, the presented findings in a patient with history of multiple NETs and TP, indicate that 68Ga-DOTA-TATE-PET/CT has a potential role in differentiating between neuroendocrine malignancy and talc-induced benign inflammatory processes.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript