

Introduction

The application of FDG PET/ scan is widespread for the diagnostic assessment of patients in Oncology. FDG is taken up by dedifferentiated thyroid cancer cells, which are poorly iodine avid. This metabolic study is helpful in the patient with an increased serum tumoral markers and negative radioiodine scan.

Objective

The aim of this report is to describe our initial experience with PET/CT to date in patient with suspicious for dedifferentiated thyroid carcinoma.

Methods

Retrospective observational study. A total of 28 FDGPET/CT scans were performed between January 2014 to June 2015. The rhTSH-stimulated PET/CTFDG (5 MBq/kg) was performed in a hybrid computer BIOGRAPH mCT128 SIEMENS, after two 0.9mg intramuscular doses of rhTSH (Thyrogen-Genzyme) administered before imaging. Measurement of serum TSH, anti-thyroglobulin antibodies(ATc) and thyroglobulin(Tg) levels was performed before FDG injection. Qualitative and semiquantitative evaluation were performed with PET/CTFDG; this findings were correlated with demographic information, tumor histology, image studies and serum tumoral markers.

Results

28 patients (20 women and 8 men; 56 ± 11 years). Twenty-three patients had papillary carcinoma, one had micropapillary carcinoma, one had insular carcinoma and two had follicular thyroid carcinoma. All patients had previously undergone total thyroidectomy and iodine therapy (The acumulative total iodine dose was 371 +/- 240 mCi (ranged 100 to 1100 mCi) (Table 1). PET/CT-FDG findings were positive in 20, negative in 5 and no clear in 3 cases. The Tg level was 872 +/- 3167 (ranged 0.04-16853) and the ATg level was 168 +/- 754 (ranged 0.6-4000). SUV máx was 7.7 +/- 10.5 g/ml (ranged 0-54.7). The serum tumor markers levels was not a predictor for the PET/CT results; patients with negative ATG or Tg values less than 10 microg/L showed positive scans.

Characteristic	Value (n=28)
Age, y Mean ± SD	56 ± 11
Gender, n (%)	
Female	20 (71)
Male	8 (29)
Carcinoma Patology, n (%)	
Papillary	23 (82)
Follicular Thyroid	2 (7)
Micropapillary	1 (3,5)
Insular	1 (3,5)
Treatment	
Total thyroidectomy, n (%)	28 (100)
Iodine Therapy. mCi Mean ± SD	371 ± 240

FIGURE 1. DEMOGRAPHIC CHARATERISTICS.

Tumor markers	Total (n=28)	Positive (n=20)	Negative (n=5)	No clear (n=3)	SUVmax Mean ± SD (Range)
Tg					
Mean ± SD (Range)	872±3167 (0,04 – 16853)	1132±3735 (0,04 – 16853)	43 ± 80 (0,4 – 187)	172 ± 297 (0,4 – 516)	-
Tg >10 mg/L, n (%)	22 (79)	16 (80)	4 (80)	2 (66)	8,7 ± 12 (0 – 54,7)
Tg <10 mg/L, n(%)	6 (21)	4 (20)	1 (20)	1 (33)	6 ± 7,9 (2,2 – 18)
ATG					
Mean ± SD (Range)	168 ± 754 (0,6 – 4000)	306 ± 984 (0,6 – 3712)	1342 ± 2301 (0,7 – 4000)	34 ± 43 (0,7 – 83)	-
SUV max					
Mean ± SD (Range)	7,7 ± 10,5 (0 – 54,7)	10,5 ± 11 (2,9 – 54)	-	2,2 ± 0,15 (2,1 – 2,4)	-

FIGURE 2. CORRELATION BETWEEN PET/CT RESULTS AND SERUM TUMOR MARKERS.

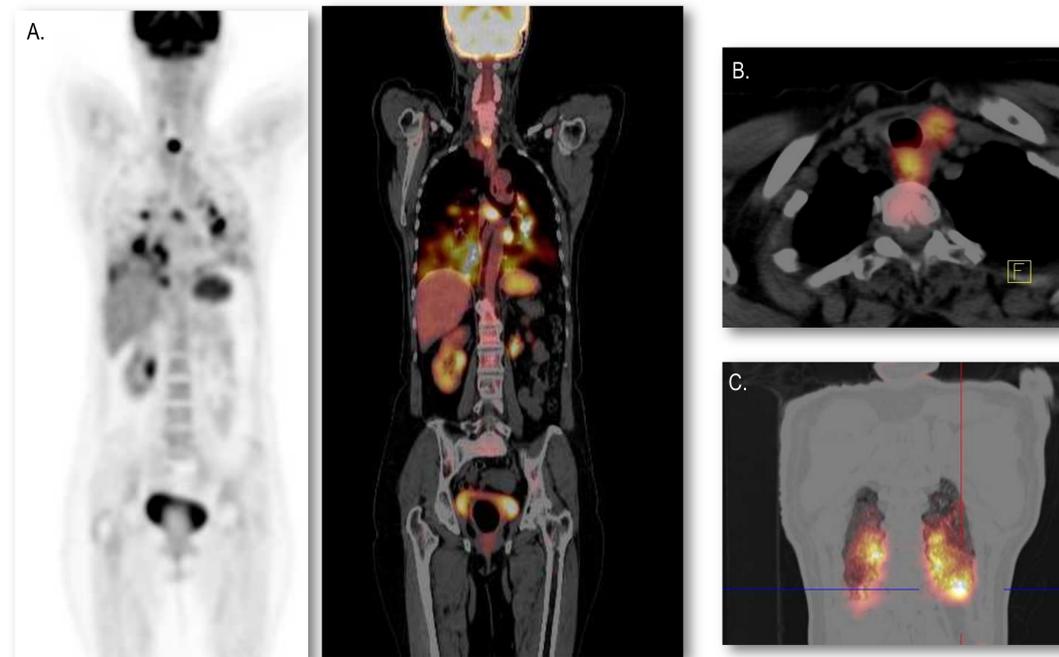


FIGURE 3. RELEVANT CASES.

A. 45 years old female with a follicular thyroid carcinoma, treated with surgery and I131 (total acumulative dose of 800 mCi). High Tg levels (867 g/ml). Last radioactive iodine scan was negative. PET/CT evidenced thyroid tissue remnants with pulmonary and pleural metastatic disease.

B. 67 years old male with papillary carcinoma, treated with surgery and I131 (total acumulative dose of 300 mCi). At follow up, dysphagia, with high levels of Tg and ATG. A diagnostic radioiodine scan performed after the administration of 10 mCi only revelead minimal cervical uptake. PET/CT evidenced uptake in thyroid tissue remnants and esophagic mass.

C. 34 years old female with papillary carcinoma, treated with surgery and I131 (total acumulative dose of 500 mCi). At follow up, persistent elevation of ATG levels, with negative diagnostic images. PET/CT evidenced intense hypermetabolism in pulmonary nodes suggested of difusse pulmonary metastatic disease.

Conclusion

Our initial experience indicates that functional information obtained by a FDG PET/CT scan is useful in patients with well differentiated thyroid cancer, in whom dedifferentiation is suspected. This series shows that the cutoff value of 10 microg/L for the Tg, is not useful to select patient candidates for PET/CT-FDG studies to detect dedifferentiated thyroid cancer.