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Interesting images

# Malignant somatic transformation arising from teratoma in metastatic testicular germ cell tumor detected on $^{18}$F-FDG PET/CT☆

## Transformación somática maligna derivada de un teratoma en un tumor testicular metastásico de células germinales detectado mediante PET/TC con $^{18}$F-FDG

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Two patients with malignant somatic transformation (MST) are described. The first is a 42-year-old man with a testicular non-seminoma germ cell tumor (NS-GCT) stage III diagnosed in 2007, who was initially treated with orchiectomy and chemotherapy (BEP for 3 cycles). Three months after he had progressive disease in form of teratoma in the mediastinum and supraclavicular, subsequently he received a second-line chemotherapy. In 2012, he had biochemical recurrence treated with third-line chemotherapy.

One year later an $^{18}$F-FDG PET/CT showed progression in retroperitoneal and mediastinal masses (Fig. 1). The right retroperitoneal solid component was biopsied with a diagnosis of adenocarcinoma with mucinous differentiation from the colon. At this time, endoscopies, beta-hCG and alfa-fetoprotein (AFP) were negative, however, carcinoembryonic antigen (CEA) was elevated. There was no KRAS, NRAS or BRAF mutations. In this setting, the diagnosis was revised to a MST of teratoma. The patient commenced treatment with FOLFOX and then changed it to FOLFIRI and Panitumumab, in the setting of a rising CEA.

The second case is a 47-year-old man with a right testicular NS-GCT diagnosed in 2002 (Fig. 2), who was initially treated with orchiectomy and chemotherapy (BEP 4 cycles). Six months and seven years after completion of chemotherapy, the patient had left supraclavicular and retroperitoneal progression, respectively, both resected. In 2019, left nephrectomy was performed due to progressive disease in the retroperitoneum and a left renal mass, in both locations, a mucinous adenocarcinoma well-differentiated was diagnosed. Endoscopies, beta-hCG, AFP and CEA were normal.

MST is a rare phenomenon in NS-GCT, with an incidence of 3–9%. This entity arises from a teratoma and encompasses various types of malignancies including sarcomas, carcinomas (adenocarcinomas and squamous cell carcinoma), PNETs or others. MST could present as primary gonadal or extra-gonadal or metastatic tumor. MST has worse prognosis compared to GCT, with a cancer specific survival (CSS) of 50–60% vs 80–95%, respectively[1]. Two-thirds of MST patients had stage II and III at diagnosis[2]. Surgery with complete resection and negative margins is the gold-standard and improves the CSS significantly[3]. Histology-specific chemotherapy regimens have been suggested, due to the resistance of MST to GCT schemes[3]. In recent published articles, carcinomas appear to have better prognosis than sarcomas[2].

MST should be suspected in patients with non-seminomas in whom metastasis remains stable or enlarging with descending or normal tumoral markers[3].

As in the index clinical cases, adenocarcinoma is appeared in the late relapse after five years of the initial diagnosis, compared to sarcomas who tend to appear promptly[2].

$^{18}$F-FDG PET/CT has clinical indications and apparently prognostic implications in patients with testicular cancer, however, there are no cases described in the MST context. In these cases, $^{18}$F-FDG PET/CT was useful to provide disease surveillance, guide biopsy and assess treatment response.

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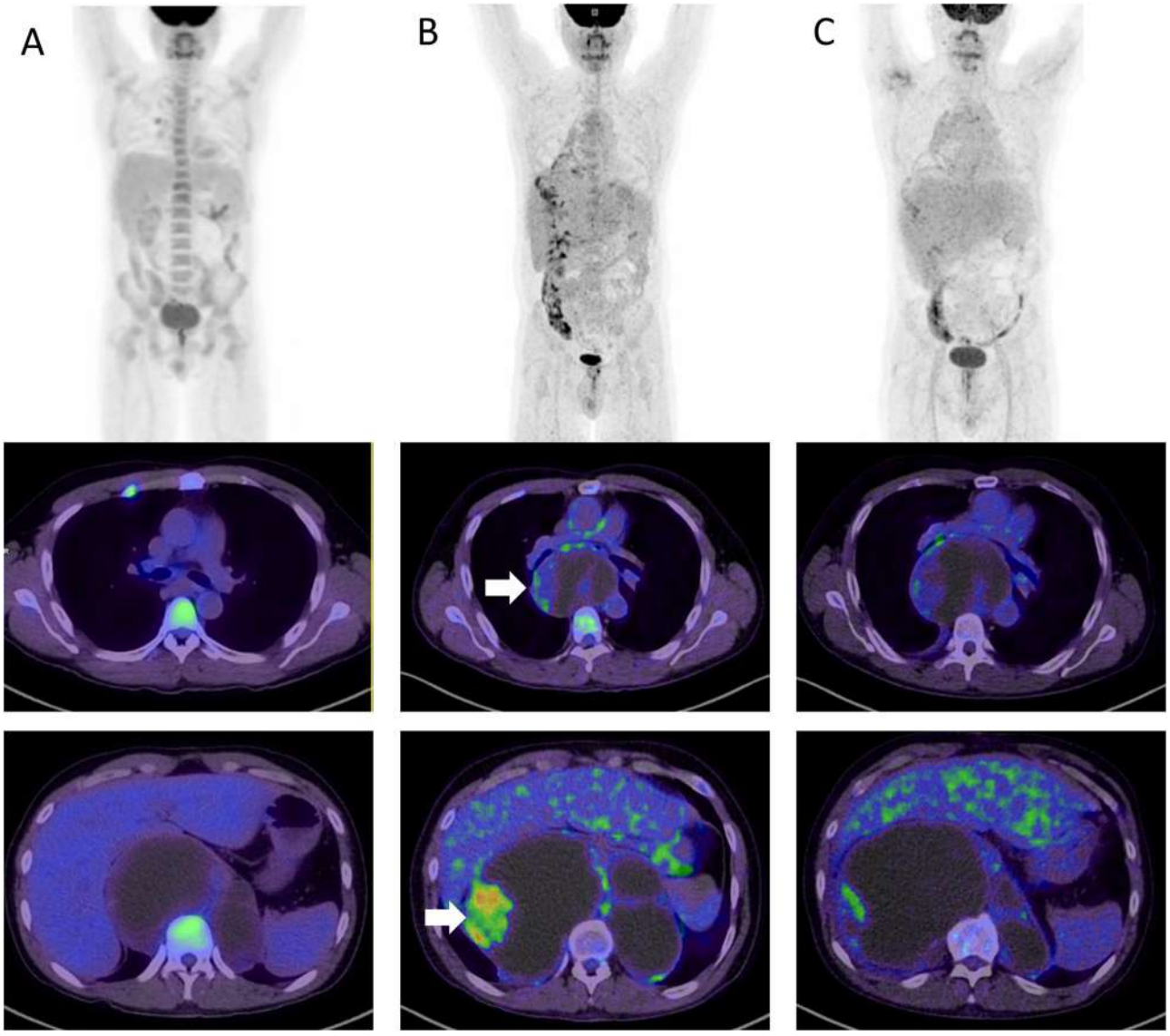


**Figure 1.** Maximum projection intensity (MIP) in the upper row and $^{18}$F-FDG PET/CT fused image in mid and bottom rows. In B, there are mixed retroperitoneal and mediastinal masses (solid and cystic). The retroperitoneal measured 52 × 47 mm in axial axes with a SUVmax: 14.7 in the solid component, both masses had progression compared to prior study (column A). This solid component (white arrow in B, bottom row) was biopsied. On column C, there is an $^{18}$F-FDG PET/CT with partial response after the last chemotherapy cycle in the solid component of the index retroperitoneal mass. Mediastinal, left retroperitoneal and pelvic masses (not shown) remained stable in the three scans and with low FDG-uptake likely related to low-grade tumor (teratoma).

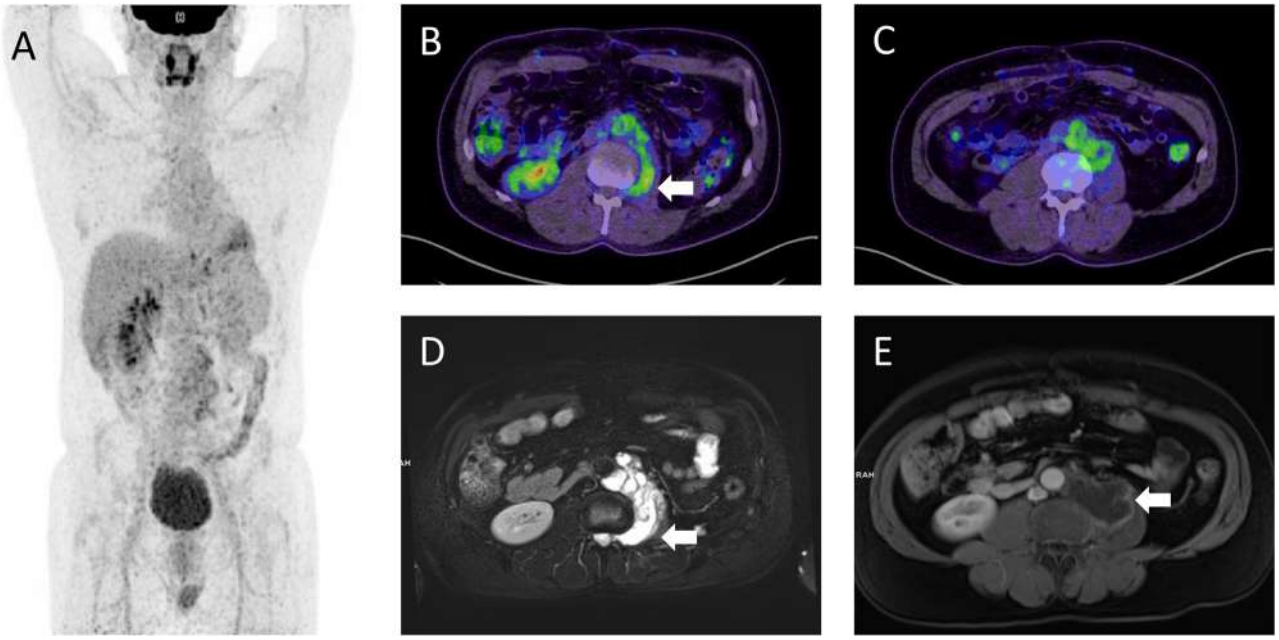


**Figure 2.** $^{18}$F-FDG PET/CT shows a para-aortic retroperitoneal mass of 6 × 8 × 12 cm (extending from L2 to L5), with a mild tracer uptake (SUVmax 5) (arrow in B). On MRI, this mass is hyper-intense in T2 (arrow in D) and hypo-intense in T1 and with a peripheral contrast-enhanced (arrow in E), moreover, there is an apparently infiltration of L2 left neural foramen. There was no evidence of other sites of disease.

## Conflict of interest

The author has no conflicts of interest to declare.

## References

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