

# A Rare Case: <sup>18</sup>F-FDG PET/CT Confirmed Isolated Solitary Splenic Metastasis Originated from Gastric Carcinoma

Nadir Görülen İzole Soliter Splenik Metastaz Olgusu:  
<sup>18</sup>F-FDG PET/CT ile Konfirme Edilen  
Gastrik Karsinoma Metastazi

Aynur ÖZEN,<sup>a</sup>  
Talar VARTANOĞLU,<sup>b</sup>  
Esat NAMAL,<sup>c</sup>  
Özgül EKMEKÇİOĞLU,<sup>a</sup>  
Fatih ÇELEBİ<sup>b</sup>

Clinics of

<sup>a</sup>Nuclear Medicine,

<sup>b</sup>General Surgery,

Bağcılar Training and Research Hospital,

<sup>c</sup>Department of Medical Oncology,

İstanbul Bilim University

Faculty of Medicine, İstanbul

Geliş Tarihi/Received: 14.03.2016

Kabul Tarihi/Accepted: 05.11.2016

*This case was presented as a poster at the  
27<sup>th</sup> Annual Congress of Nuclear Medicine,  
April 1-5, 2015, Adana-Turkey.*

Yazışma Adresi/Correspondence:

Aynur ÖZEN

Bağcılar Training and Research Hospital,

Clinic of Nuclear Medicine, İstanbul,

TÜRKİYE/TURKEY

ozenaynur@gmail.com

**ABSTRACT** Gastric carcinoma splenic metastases are rare and usually reported as a part of multi-organ metastases. In a 62yrs old man suffering dyspepsia, abdominal pain and weight loss, stomach-antrum adenocarcinoma was detected by endoscopy and confirmed by biopsy and a total gastrectomy was performed. Taken into account the HER2/neu negativity of the primary tumor, immuno-histochemically assessed, 8 cycles of FOLFOX were applied. On follow-up, a newly developed, 22 mm hypo-dense lesion, located sub-capsularly in the spleen was detected on abdominopelvic CT, without any tumor marker elevation. For restaging an <sup>18</sup>F-FDG PET/CT scan was performed, a hypermetabolic lesion into the spleen was depicted, followed by splenectomy and distal pancreatectomy. Histologically, isolated solitary gastric adenocarcinoma metastasis was confirmed. On immuno-histochemical study a HER2/neu +3 positivity was detected, so trastuzumab was applied, as targeted therapy.

**Key Words:** Stomach neoplasms; fluorodeoxyglucose f18; neoplasm metastasis; spleen; her2 protein, human

**ÖZET** Gastrik karsinomunun splenik metastazları nadirdir ve genellikle multi-organ metastazının bir parçası olarak saptanır. Dispepsi, karın ağrısı ve kilo kaybı şikayetleri ile başvuran 62 yaşındaki erkek hastada yapılan endoskopide mide antrumunda adenokarsinom tespit edilip total gastrektomi uygulandı. İmmunohistokimyasal çalışmada primer tümör HER2/neu negatif olduğundan 8 kür FOLFOX rejimi verildi. Takibinde tümör marker yüksekliği saptanmayan hastada abdominopelvik BT'de dalak anterior polde yeni gelişmiş subkapsüler yerleşimli 22 mm çaplı hipodens lezyon tespit edildi. İzole splenik metastaz ile uyumlu yoğun <sup>18</sup>F-FDG tutulumu izlenmesi ve başka bir metastatik odak tespit edilmemesi üzerine hastaya splenektomi ve distal pankreatektomi uygulanarak gastrik karsinomunun izole soliter adenokarsinom metastazı olduğu konfirme edildi. Metastazdan yapılan immunohistokimyasal çalışmada HER2/neu 3+ olarak saptandığından hastaya hedefe yönelik trastuzumab tedavisi başlandı.

**Anahtar Kelimeler:** Mide neoplazileri; florodeoksiglukoz f18; tümör metastazı; dalak; her2 protein, insan

**Türkiye Klinikleri J Case Rep 2016;24(4):358-61**

Isolated splenic metastases are rare. Worldwide references report a 0.6% incidence of secondary tumors of the spleen, at autopsy, and a 1.1% incidence on splenectomy.<sup>1</sup> A splenic metastasis due to gastric carcinoma can be detected as a part of multi-organ metastases. Isolated solitary splenic metastases are seldom, and only a few cases in the literature are referred.<sup>2</sup> Nowadays, for staging, restaging, and treatment response assessment, <sup>18</sup>F-FDG PET/CT is routinely used.<sup>3-5</sup>

doi: 10.5336/caserep.2016-51307

Copyright © 2016 by Türkiye Klinikleri

## CASE REPORT

In a 62 yr old man with dyspepsia, abdominal pain and weight loss, an adeno-carcinoma of the stomach-antrum was endoscopically identified. For staging, <sup>18</sup>F-FDG PET/CT imaging by Gemini GXL PET/CT camera (Philips Healthcare, The Netherlands) was performed to the patient after a 6hr fasting and an 1 hr of 415 MBq (11.2 mCi) <sup>18</sup>F-FDG.

On the aforementioned <sup>18</sup>F-FDG imaging, an intense FDG uptake was identified, covering the area between the cardia of the stomach-antrum to the lesser curvature and posteriorly, along the greater curvature. Moreover, adjacent to the lesser curvature of the stomach, multiple lymph nodes, in millimeter size, were noticed, with the suspicion of multiple metastases. Thereafter, the patient un-

derwent total gastrectomy. Furthermore, due to the HER2/neu negativity of primary tumor in the immunohistochemical study, the patient underwent eight cycles of FOLFOX.

On follow-up, without any tumor marker increase, a newly developed hypo-dense lesion about 22 mm, located at the anterior pole of the spleen was detected subcapsularly by CT, and due to the doubt of metastasis, a PET/CT was performed again, for restaging after i.v. infusion of 315 MBq (8,5 mCi) <sup>18</sup>F-FDG.

On PET/CT scanning, an intense FDG uptake in the splenic lesion (Figure 1) was observed without any abnormal focus in the other area (Figure 2). So, patient underwent distal pancreatectomy and splenectomy. This splenic lesion deemed ab-

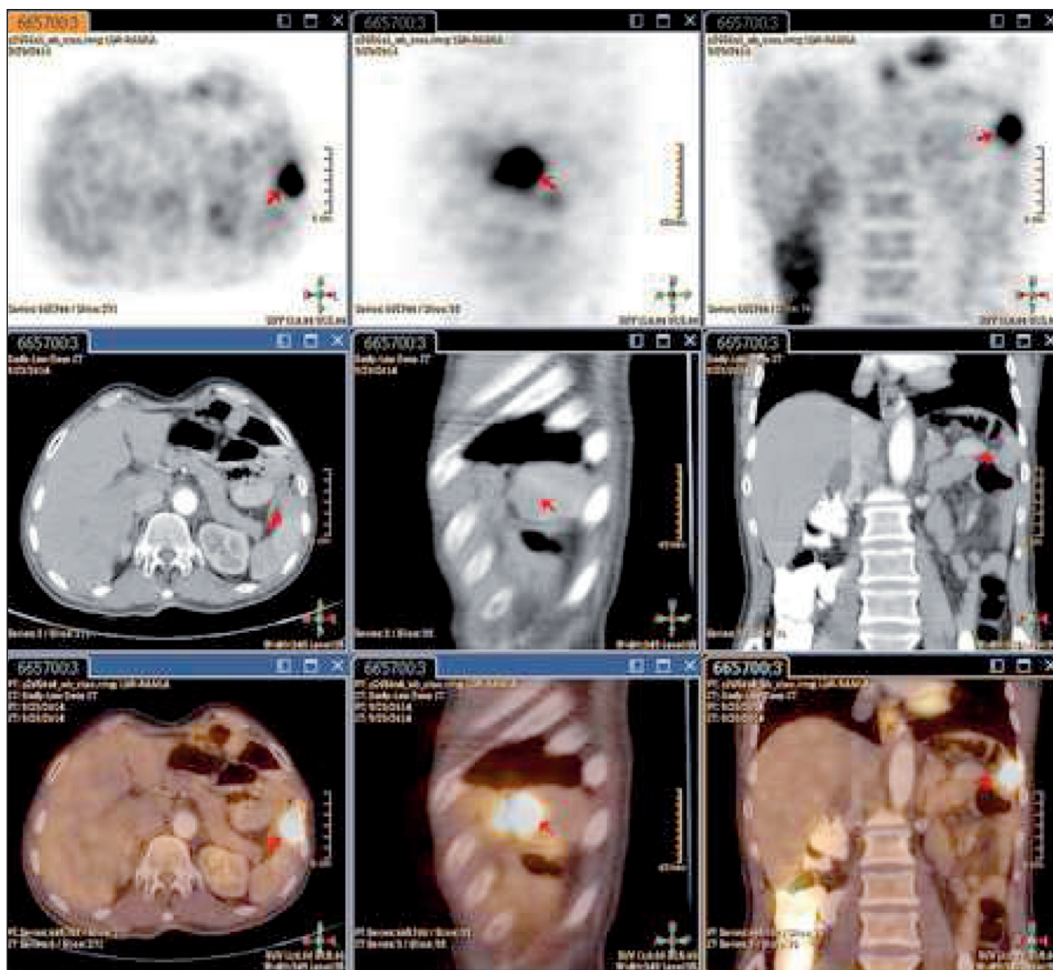
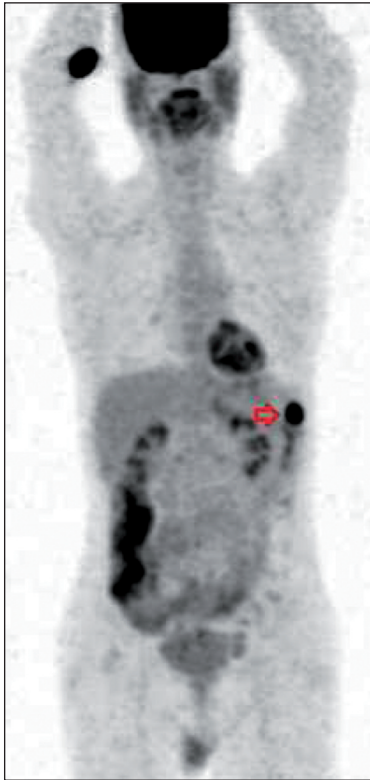


FIGURE 1: In gastric cancer case, isolated solitary splenic metastasis is seen in image of PET (1st row), CT (2nd row) and PET/CT fusion (3th row) with red arrow.



**FIGURE 2:** In whole body image, it does not appear another metastatic focus except to isolated solitary splenic metastasis (red arrow).

normal during surgery and on pathological examination revealed an isolated solitary metastasis originated from the excised gastric adeno-carcinoma. Immuno-histochemically a 3+ Her2/neu was detected and trastuzumab, as targeted therapy was applied. Written informed consent was obtained.

## DISCUSSION

In a clinico-pathologic review-study of the last 25 years splenic metastases were frequently observed in older ages (average: 60 years). Symptomatic metastases are more often detected compared to the asymptomatic ones with and incidence in women and in younger ages of approximately 8%. Moreover, a 95% of splenic metastases were adenocarcinoma, originated from lung in a 21% and from stomach, in 16%; furthermore, primaries in pancreas (12%), liver (9%) and colon (9%) were reported but rarer in esophagus, nasopharynx, and

chorium (choriocarcinoma). It is worth to notice that a 31% of lesions were identified as solitary and 30% as multiple lesions. Moreover, approximately 5.3% was detected as an isolated splenic metastasis.<sup>1</sup> In the literature, in 19 patients, splenic metastases and treated by splenectomy were reported (1, laparoscopically). Twelve of them had a gastric carcinoma, associated by a solitary splenic metastasis.<sup>2</sup>

The rarity of splenic metastases might be explained due to (1) the poor embryologically development of the lymphoid system of the spleen, preventing the transportation of cancer cells into the organ, via the lymphatics due to the lack of afferent lymphatic vessels, (2) the sharp angled splenic artery arised from the celiac truncus, preventing also the circulation and deposit of tumor cells and (3) spleen micro-environment, having the ability to inhibit the growth of metastatic foci.<sup>6</sup>

It is interesting to notice that while the primary lesion was HER2/neu negative, the spleen metastasis was HER2/neu positive receptor. This important mismatch has been also observed and reported in a study, conducted by Ieni et al, where in a large cohort of 108 examined cases, a discordance between the primary gastric carcinoma lesions and the lymphatic metastases was determined in a percent of 9.26%.<sup>7</sup> In this study, the samples were taken from the primary as well as from the metastatic (lymph nodes) lesions, simultaneously. This mismatch in HER2/neu receptor status has been similarly reported in the follow-up of metastases, due to breast carcinoma.<sup>8</sup> As a sequence, in our case according to this HER2/neu receptor positive tissue turnover, a successful targeted treatment with trastuzumab (anti-HER2/neu) could be achieved.

It could be concluded that due to the 'balance' of a negative HER2/neu receptor status to a positive one, observed in this rare isolated splenic metastasis, proved by biopsy and PET/CT, the appropriate therapy with trastuzumab could be applied as a targeted therapy of choice.

## REFERENCES

1. Lam KY, Tang V. Metastatic tumors to the spleen: a 25-year clinicopathologic study. *Arch Pathol Lab Med* 2000;124(4):526-30.
2. Zhu YP, Mou YP, Ni JJ, Zhou YC, Jiang JW, Jiang ZN, et al. Isolated splenic metastases from gastric carcinoma: a case report and literature review. *World J Gastroenterol* 2013; 19(31):5199-203.
3. Filik M, Kir KM, Aksel B, Soyda Ç, Özkan E, Küçük ÖN, et al. The role of 18F-FDG PET/CT in the primary staging of gastric cancer. *Mol Imaging Radionucl Ther* 2015;24(1):15-20.
4. Cayvarlı H, Bekis R, Akman T, Altun D. The role of 18F-FDG PET/CT in the evaluation of gastric cancer recurrence. *Mol Imaging Radionucl Ther* 2014;23(3):76-83.
5. Robb WB, Mariette C. Predicting the response to chemotherapy in gastric adenocarcinoma: who benefits from neoadjuvant chemotherapy? *Recent Results Cancer Res* 2012; 196:241-68.
6. Compérat E, Bardier-Dupas A, Camparo P, Capron F, Charlotte F. Splenic metastases: clinicopathologic presentation, differential diagnosis, and pathogenesis. *Arch Pathol Lab Med* 2007;131(6):965-9.
7. Ieni A, Barresi V, Caltabiano R, Caleo A, Bonetti LR, Lanzafame S, et al. Discordance rate of HER2 status in primary gastric carcinomas and synchronous lymph node metastases: a multicenter retrospective analysis. *Int J Mol Sci* 2014;15(12):22331-41.
8. Qu Q, Zong Y, Fei XC, Chen XS, Xu C, Lou GY, et al. The importance of biopsy in clinically diagnosed metastatic lesions in patients with breast cancer. *World J Surg Oncol* 2014;12:93.