

## Colon carcinoma metastases with extension to chest wall and pericardium

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### ABSTRACT

Management of locally advanced colon cancer metastases is challenging and operation carries an increased risk of morbidity and mortality. The knowledge of exact sites of involvement can aid the surgeon to make a decision regarding complete resection or palliative therapy. PET/CT scan is an advantage in this setting because metabolic alterations often precede the anatomic changes; moreover, it can show unexpected metastases. In addition, PET/CT scan can differentiate adhesions and scar from local invasion of tumor. We report a rare case of locally advanced colon cancer metastases to mesentery with extension to liver, chest wall and mediastinum depicted on PET/CT scan. The patient was treated with resection of the involved sites. The pathology report confirmed a poorly differentiated adenocarcinoma mainly involving the mesentery with extension to surrounding organs including the liver. Unfortunately, the patient's condition deteriorated following surgical intervention. Although there is a trend toward complete resection of primary tumor and involved sites in patients with metastatic colon carcinoma to improve overall patient survival by eliminating any residual disease, in more advanced stages of the disease, palliative therapy might be the preferred approach. PET/CT has invaluable complimentary role to improve surgical planning in advanced oncological situations.

**Key words:** Colon cancer; Metastasis; Chest wall

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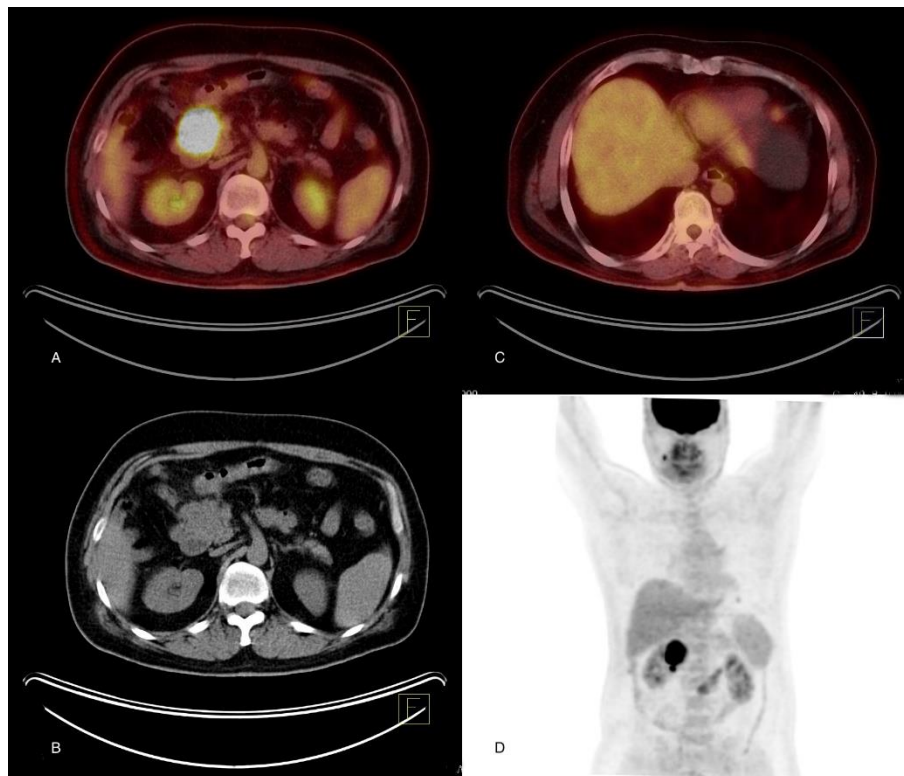
## INTRODUCTION

Colon carcinoma is one of the most common cancers. Overall 40-50% of colon cancers recur and 10-20% have local recurrences [1]. The most common site of metastasis of colon cancer is the liver [2]. Early detection and treatment of recurrence can improve patient outcome. Mesenteric involvement of colon cancer is an indication of worse outcome in stage III of the disease [3]. Although several rare presentation of colon carcinoma metastases have been reported [4, 5], colon cancer metastases with locally advanced disease involving the chest wall and mediastinum is quite rare. Herein, we report a rare case of colon carcinoma in a 52-year-old male with extensive metastases to mesentery with involvement of liver and chest wall.

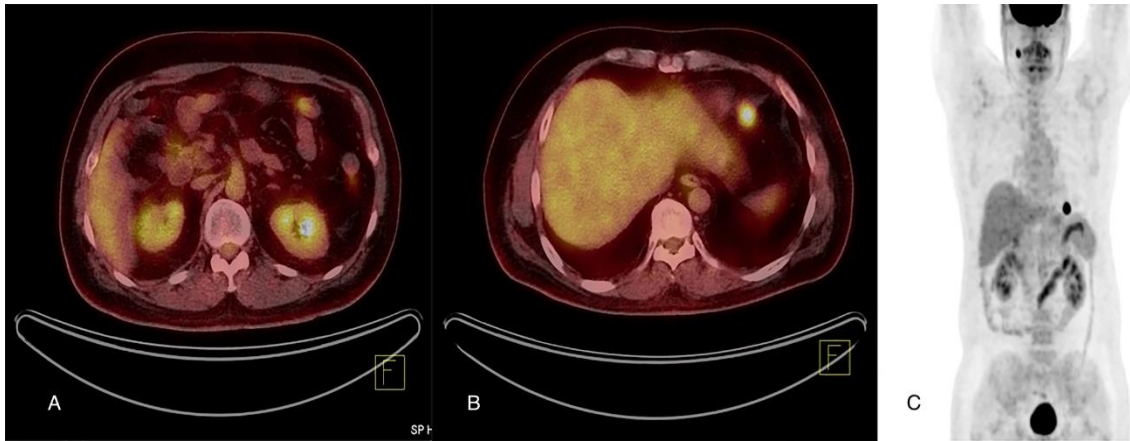
## CASE PRESENTATION

A 52-year-old man with a history of colon carcinoma and right hemicolectomy for a colon mass in the hepatic flexure was referred to our center for the evaluation of disease status using fluorodeoxyglucose ( $^{18}\text{F}$ -FDG) positron emission tomography (PET)/computed tomography (CT) scan. The patient

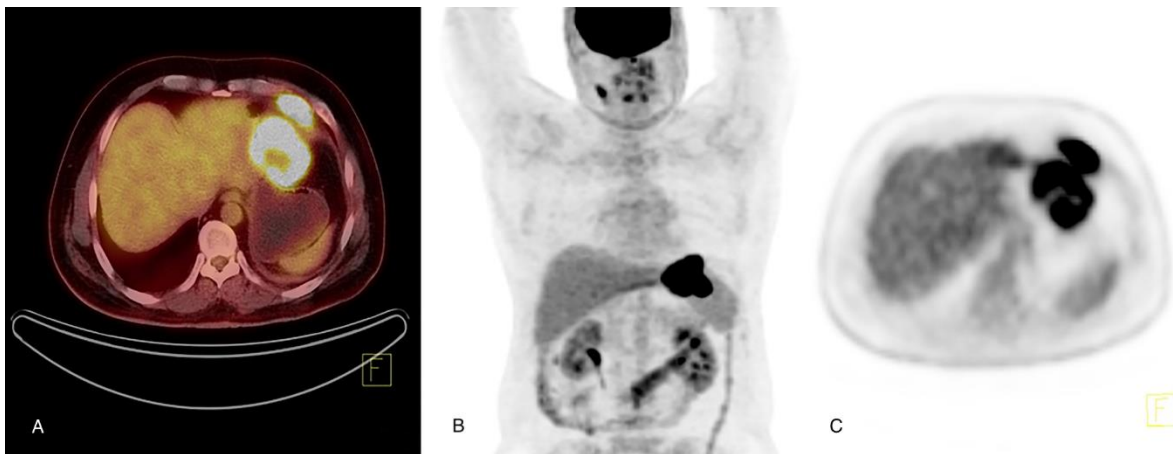
had undergone surgery two years prior and histologically diagnosed as well differentiated adenocarcinoma invading the serosa (T3). In addition, 4 out of 8 lymph nodes were involved with cancer (N2), representing stage IIIB. Despite receiving post-operative chemoradiotherapy, the patient's PET/CT scan "performed on December 2016" revealed a hypermetabolic mass in the right upper quadrant, as well as a soft tissue density with minimal  $^{18}\text{F}$ -FDG uptake in the left upper quadrant, which was falsely characterized as a splenule (Figure 1). Therefore, the patient was treated with radiotherapy and was referred for the post-treatment PET/CT scan on April 2017, which demonstrated improvement in the metabolic activity of the right upper quadrant mass, however increased metabolic activity was noted in the left upper quadrant lesion (Figure 2). The patient was further treated with radiotherapy. Subsequent PET/CT scan performed on July 2018 depicted the progression of the left upper quadrant hypermetabolic mass and extension to the left hemi-diaphragmatic leaflet (Figure 3).



**Fig 1.**  $^{18}\text{F}$ -FDG PET/CT image acquired during the first referral (2016). (A)  $^{18}\text{F}$ -FDG PET/CT fusion image (A) and axial computer tomography (CT) image (B) demonstrate the soft tissue density with increased metabolic activity in the right upper quadrant (RUQ).  $^{18}\text{F}$ -FDG PET/CT fusion image (C) demonstrates the small soft tissue density with mild metabolic activity in the left upper quadrant (LUQ). MIP (maximal intensity projection)  $^{18}\text{F}$ -FDG PET image (D) demonstrates the hypermetabolic mass in the right upper quadrant (RUQ) as well as a faint focus of activity in the left upper quadrant (LUQ).



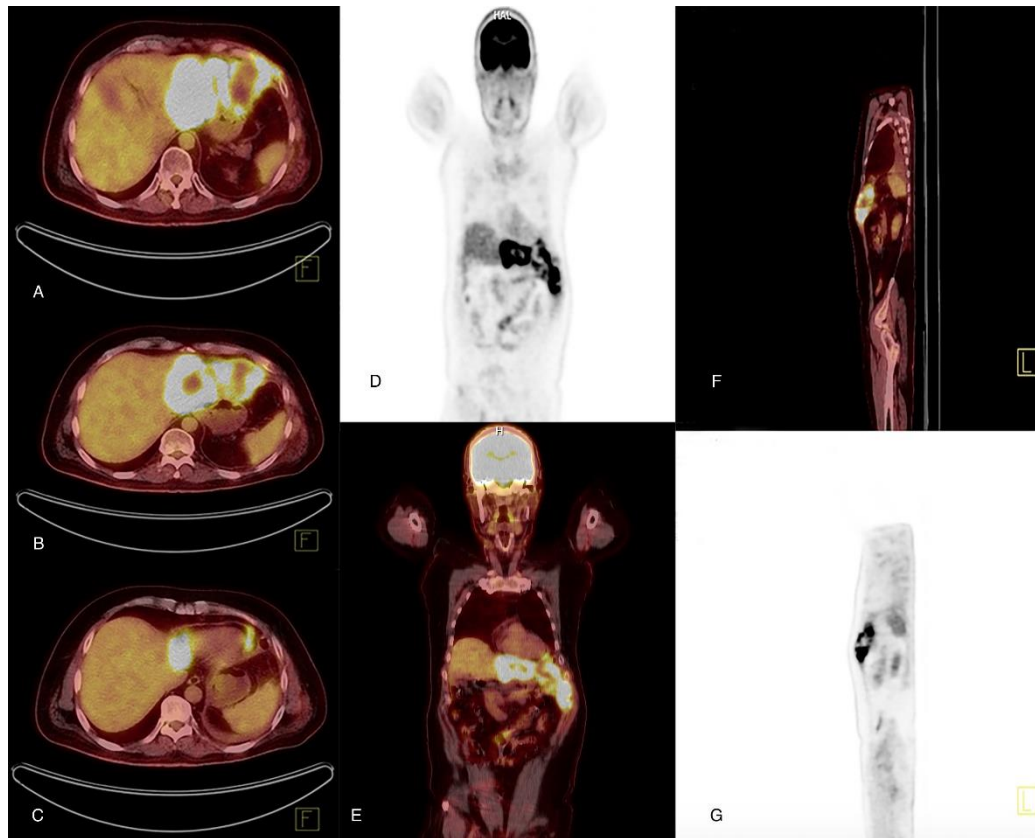
**Fig 2.**  $^{18}\text{F}$ -FDG PET/CT acquired during the second referral (2017). PET/CT fusion image (A) demonstrates decreased metabolic activity in the RUQ.  $^{18}\text{F}$ -FDG PET/CT fusion image (B) depicts increased metabolic activity in the LUQ. MIP (maximal intensity projection) FDG PET (C) reveals the resolution of the RUQ mass; however, the metabolic activity in the LUQ is increased.



**Fig 3.**  $^{18}\text{F}$ -FDG PET/CT performed during the third referral (2018).  $^{18}\text{F}$ -FDG PET/CT fusion image (A) demonstrates the progression of the metabolic activity in the LUQ. MIP (maximal intensity projection) FDG PET (B) demonstrates the hypermetabolic mass in the LUQ.  $^{18}\text{F}$ -FDG PET image (C) depicts the extension of metabolic activity in the LUQ.

Finally, the patient was referred to our center in December 2019 for the evaluation of intraabdominal mass. He was found to have an elevated CEA level of 81.6 ng/ml (normal level  $<5 \mu\text{g/ml}$ ) and an elevated CA19-9 level of 138.1 (normal up to 37 U/ml). On the PET/CT scan, there was a metastatic mass with hypermetabolic periphery and hypometabolic center involving segments II and III of the liver, as well as, a hypermetabolic tumoral mass with hypometabolic center located in the left subdiaphragmatic region involving the mesentery, extending to the adjacent gastric wall, left leaflet of diaphragm, left lower intercostal muscles of the anterior chest wall and apical part of pericardium indicative of significant disease progression (Figure 4).

Subsequently, the patient underwent gastrectomy, resection of abdominal wall mass as well as left hepatic metastectomy. The pathology report indicated transformation of the primary pathology from well differentiated to a poorly differentiated adenocarcinoma of the mesentery in the specimens received from left liver lobe, the esophagus and abdominal wall mass. Post operationally the patient developed dyspnea, nausea and vomiting. Sonographic examination revealed, a hypodense focus measuring about 51mm x 53 mm x 59 mm and volume of 80 cc at the site of left hepatic lobe resection most likely representing a hematoma or seromal collection. After surgery the patient's symptoms has gradually deteriorated.



**Fig 4.**  $^{18}\text{F}$ -FDG PET/CT obtained in the last referral (2019). FDG PET/CT fusion images (A) and (B) demonstrates the necrotic metabolically active tumoral mass in the left hepatic lobe as well as the LUQ extending to chest wall.  $^{18}\text{F}$ -FDG PET/CT fusion image (C) depicts the metabolic activity in the apical pericardium. Coronal PET (D) and coronal  $^{18}\text{F}$ -PET/CT fusion (E) images reveals the LUQ mass extending to the chest wall and epical pericardium. Sagittal PET (F) and sagittal PET/CT fusion (G) images demonstrate the LUQ mass.

## DISCUSSION

Colon cancer is the third most common cancer in the world. This malignancy spreads through peritoneal fluid, blood circulation or lymphatic routes. Liver and peritoneum are the most common sites of metastases [6]. Tumor nodules are sometimes seen in the mesentery near the primary tumor site and have been reported to be an indicator of worse outcome [3].

Previously, there have been rare reports of metastases from colon cancer to the mediastinum with the primary cancer, mostly located in the ascending colon. Brazao et al. reported a rare case of metastatic mediastinal mass from colorectal cancer causing superior vena cava syndrome [5]. Colon cancer with metastatic involvement of the cutaneous tissue is another unusual finding [4, 7] Approximately, 10% to 20% of colon cancer patients show involvement of the adjacent organs at the time of diagnosis. Tenreiro et al. reported a case of colon cancer with direct extension to cutaneous tissue who was treated with en block resection [7]. Our case represented a late demonstration of colon cancer metastases to the mesentery with extension to several unusual sites including the abdominal wall and the mediastinum

(i.e. epicardial pericardium) causing pleural effusion. Although, lymphatic extension of colon cancer to the mediastinum has been previously reported, direct extension to pericardium is an unusual finding. Direct extension of a tumor to the pericardium has been previously reported with lung, esophageal, breast cancers and lymphomas [8].

Locally advanced colorectal cancer with extensive involvement of adjacent organs is a rare finding [9]. Surgical management of locally advanced metastases is challenging. It has been suggested that when locally advanced right colon cancer with involvement of adjacent organs is present and complete resection is achievable, extended multi-visceral surgical resection should be performed [10]; however, the complication of this type of surgery is of great concern. Approximately one third of patients develop post-surgical complications resulting in higher morbidity and mortality [11]. A postoperative morbidity of 12.8% was reported for en block pancreaticoduodenectomy and hemicolectomy [10]. Our patient was treated with extensive surgery; however, he developed fluid collection at the surgical bed leading to deteriorating general condition.



It has been confirmed that complete resection of the tumor may improve patient's survival, while any postsurgical residual disease can adversely affect overall prognosis. However, other factors have been reported as the predictors of outcome including the number of sites of recurrence, location of recurrence, stage of primary tumor, and presalvage CEA level. Worse outcome has been noted in patients with locoregional and mesenteric recurrences as compared with anastomotic and retroperitoneal sites of recurrence. The great challenge being appropriate selection of the patients for the complete resection based on close observation to correctly diagnose and extent of the disease and organs involved [12].

It should be noted that the extent of disease might not be completely recognized before the operation and the surgeon may not be prepared for such a complex surgery in advance. In addition, recognition of malignant invasion from benign adhesions and scars might not be possible at the time of operation [12, 13]. In patients with hepatic metastasis from colon carcinoma, PET/CT scan has superior sensitivity and specificity compared to CT for the detection of recurrent local and extrahepatic metastatic colorectal cancer. Detection of extrahepatic sites of metastases may exclude further operation and futile laparotomy; however, in some cases, PET/CT may have application in identifying potentially resectable sites by better delineation of the disease extent, thus, improving the patient's survival [13]. The alteration of metabolic activity, demonstrated on PET studies, frequently precede the anatomic changes. In addition, the unusual sites of metastases can be more frequently depicted by PET/CT as this modality is performed using a whole-body image protocol [14]. These advantages improve surgical planning for a potentially curable disease by demonstrating involved organs and excluding inoperable patients who might be preferably treated by palliative therapy.

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