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A 77-Year-Old Man with a Pulse Granuloma of the Descending Colon Identified by Fluorodeoxyglucose-Positron Emission Tomography (FDG-PET) Imaging 19 Months Following Surgical Resection for Rectal Carcinoma

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
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Conflict of interest: None declared

Patient: Male, 77-year-old
Final Diagnosis: Pulse granuloma
Symptoms: None
Medication: —
Clinical Procedure: —
Specialty: Gastroenterology and Hepatology • Oncology

Objective: Challenging differential diagnosis

Background: Food particles may sometime lodge in the intestinal wall, resulting in a granuloma. Pulse granuloma is associated with the seed of a legume and has a characteristic appearance on histology. This report describes a case of pulse granuloma of the descending colon identified by fluorodeoxyglucose-positron emission tomography (FDG-PET) imaging. Imaging was done 19 months after surgical resection for rectal carcinoma, and the results of imaging alone suggested a tumor metastasis.

Case Report: A 77-year-old man underwent sigmoid colostomy for sigmoid colon perforation due to obstruction by rectal cancer affecting the upper rectum approximately 2 years ago. Two months later, after his general condition improved, he underwent laparoscopic low anterior resection. On postoperative pathological examination, the lesion was diagnosed as stage II. Nineteen months later, computed tomography showed an irregular nodule on the dorsolateral side of the descending colon. FDG-PET revealed positive results, and peritoneal dissemination was suspected. Because the lesion was localized and there was no other evidence of metastasis, resection was performed. A pathological examination revealed a pulse granuloma with a central legume seed, and no obvious malignant findings were observed.

Conclusions: This report has highlighted the importance of imaging and histopathology in cases in which a solitary nodule is present in the bowel in a patient with previous successful treatment for malignancy. Pulse granuloma, or other types of granuloma associated with impacted food material, may be a cause of a solitary nodule, or pseudotumor, in the bowel wall.

Keywords: Colorectal Neoplasms • Foreign Bodies • Positron-Emission Tomography

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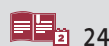
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Background

Food particles may sometimes lodge in the intestinal wall, resulting in a granuloma. Pulse granuloma is associated with the seed of a legume and has a characteristic appearance on histology [1,2]. This report describes a case of pulse granuloma, or pseudotumor, of the descending colon identified by fluorodeoxyglucose-positron emission tomography (FDG-PET) imaging 19 months after surgical resection for rectal carcinoma. Imaging results alone suggested a tumor metastasis.

Case Report

A 77-year-old man underwent emergency sigmoid colostomy for sigmoid colon perforation approximately 2 years earlier. The so-called diastatic perforation was caused by rectal cancer obstruction of the upper rectum, not perforation of the tumor site. Peritoneal lavage with 15 000 mL of saline and drainage was performed during surgery. Two months later, as the patient's general condition improved, he underwent laparoscopic low anterior resection with D3 lymph node dissection for rectal cancer. The tumor adhered to the right seminal vesicle, and it was resected. No obvious peritoneal dissemination or other foreign bodies were observed during the surgery. A histopathological examination of the resected specimen revealed a well-differentiated adenocarcinoma with invasion up to the subserosal layer. No metastases were found in the regional lymph nodes or distant organs, and the final classification of the tumor was pT3 pN0 M0, Stage IIA (Union for International Cancer Control). Because of the high risk of perforation-related recurrence, the patient was treated with oral S-1 as adjuvant chemotherapy for 6 months.

Nineteen months after tumor resection, surveillance computed tomography (CT) showed an irregular nodule on the dorsolateral side of the descending colon (Figure 1). PET showed FDG accumulation in the lesion, with a maximum standard uptake value (SUVmax) of 4.5 (Figure 2), and peritoneal metastasis was suspected. Serum carcinoembryonic antigen and carbohydrate antigen 19-9 levels were consistently normal throughout the clinical course. As there was no other evidence of metastasis, only the lesion was resected without a colon resection by laparotomy. No obvious peritoneal dissemination was observed during the surgery. No diverticulum or related perforation was found in the adjacent descending colon. A histopathological examination of the resected specimen showed a benign granulomatous and fibrotic nodule containing a legume seed in the center. There was no evidence of malignancy (Figure 3A, 3B). The patient was a nonsmoker and had not been prescribed nonsteroidal anti-inflammatory drugs (NSAIDs). He was in good health with no evidence of recurrence for 3 years since the primary tumor resection.

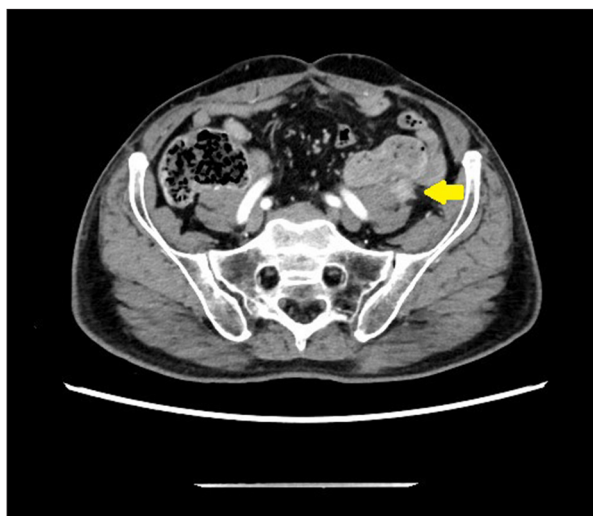


Figure 1. A 77-year-old man with a pulse granuloma of the descending colon. An abdominal contrast-enhanced computed tomography (CT) scan showing an irregular nodule on the dorsolateral side of the descending colon (arrow).

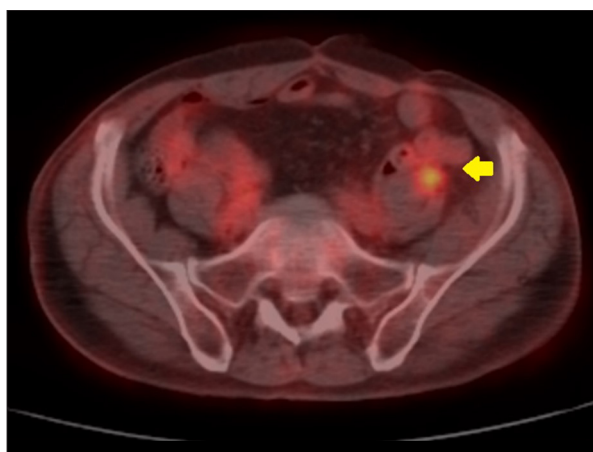


Figure 2. A 77-year-old man with a pulse granuloma of the descending colon. Fluorodeoxyglucose-positron emission tomography (FDG-PET) combined with computed tomography (CT) shows FDG accumulation in the area of the descending colon, with a maximum standard uptake value (SUV max) of 4.5 (arrow).

Discussion

Food particles may sometimes lodge in the intestinal wall, resulting in a granuloma. Pulse granuloma is associated with the seed of a legume and has a characteristic appearance on histology [1,2]. There are many reports of pulse granulomas in the oral cavity and lungs, but few case reports in the gastrointestinal tract. Nowacki et al [2] reported 22 cases of gastrointestinal tract-derived pulse granuloma and stated that all patients had a history of intestinal injury or disease. This

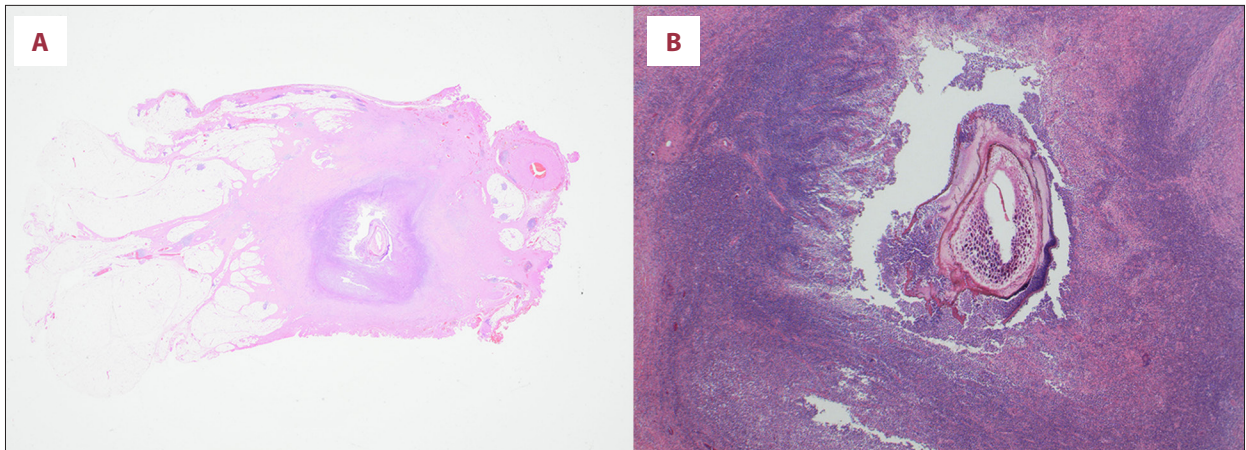


Figure 3. A 77-year-old man with a pulse granuloma of the descending colon. (A) Low-power photomicrograph of the histopathology of the excised descending colon nodule shows a benign granulomatous and fibrotic nodule, or pseudotumor, containing a legume seed in the center. There is no evidence of malignancy. Hematoxylin and eosin (H&E). Original magnification. (B) A higher-power photomicrograph shows the central legume seed, typical of a pulse granuloma. H&E. Magnification $\times 15$.

patient also had a history of perforation of the sigmoid colon, and the pulse that entered the peritoneal cavity at that time probably changed over time in the vicinity of the descending colon. Although Nowacki et al [2] also reported an association with a history of tobacco and NSAIDs, this patient had no history of tobacco use and NSAIDs.

When a patient has a history of perforation associated with obstruction due to rectal carcinoma, as in this case, and a new solitary tumor is subsequently detected in the abdominal cavity, the clinical question is whether it is recurrence. Perforation with colorectal cancer has been shown to be associated with a high risk of recurrence [3-5] and prone to peritoneal seeding recurrence [6-9]. Although it is still controversial whether the spread of tumor cells into the abdominal cavity is the reason for peritoneal dissemination [6,7], we believe that intraoperative massive peritoneal lavage may be important not only to improve peritonitis but also to prevent peritoneal dissemination in patients with perforated colorectal cancer. However, the possibility of recurrence of peritoneal dissemination should be considered after radical resection in such patients.

Although CT is commonly used for the surveillance of postoperative recurrence of colorectal cancer, FDG-PET has been reported to be useful for the diagnosis of peritoneal dissemination, with a sensitivity of 80-88% and an accuracy of 78-98.1% [10,11]. However, it should be noted that false positives have been reported with PET [12]. False positives are observed because FDG accumulates not only in the tumor tissue but also in infected and inflamed tissue. In tumor tissues, glucose metabolism is active and FDG accumulation is enhanced; however, glucose metabolism is equally active in infections (bacterial, viral, and fungal), autoimmune diseases, sarcoidosis, and others, and FDG accumulation is enhanced by the activations of granulocytes,

lymphocytes, and macrophages [13-15]. Therefore, it is difficult to reliably distinguish between tumors and inflammation based on the SUV value [15-17]. Most false-positive PET reports after colorectal cancer surgery involve surgical suture threads [18,19], mesh [12], and surgical sponges [13]. There has been no prior report about the relation between pulse granuloma and FDG-PET.

When the recurrence of peritoneal dissemination cannot be ruled out, as in this case, it is difficult to determine the treatment policy. The simultaneous resection of peritoneal metastases and the primary tumor has been reported to be effective in treating colorectal cancer [20-22]. Additionally, the guidelines (Japanese Society for Cancer of the Colon and Rectum guidelines 2019 for the treatment of colorectal cancer) recommend simultaneous resection for synchronous peritoneal metastasis if it is localized (P1, P2) [23]. Some reports also recommend resection for metachronous peritoneal dissemination, although its efficacy remains controversial [24]. In this case, resection was necessary for the definitive diagnosis of the presence of food residue. If the lesion had not been resected, the patient would have had to undergo chemotherapy, which was unnecessary in this case. Even if metachronous peritoneal metastases are suspected, it is necessary to take measures due to the possibility of diagnostic resection for localized lesions.

Conclusions

This report has highlighted the importance of imaging and histopathology in cases in which a solitary nodule is present in the bowel of a patient with previous successful treatment for malignancy. Pulse granuloma, or other types of granuloma associated with impacted food material, may be a cause of a solitary nodule, or pseudotumor, in the bowel wall.

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Conflict of Interest

None.

References:

1. DeRoche TC, Gates GA, Huber AR. Pulse granulomas of the gastrointestinal tract and gallbladder: report of five cases. *Case Rep Pathol.* 2017;2017:2497945
2. Nowacki NB, Arnold MA, Frankel WL, et al. Gastrointestinal tract-derived pulse granuloma: Clues to an underrecognized pseudotumor. *Am J Surg Pathol.* 2015;39:84-92
3. Chen TM, Huang YT, Wang GC. Outcome of colon cancer initially presenting as colon perforation and obstruction. *World J Surg Oncol.* 2017;15:164
4. Ho YH, Siu SK, Buttner P, et al. The effect of obstruction and perforation on colorectal cancer disease-free survival. *World J Surg.* 2010;34:1091-101
5. Asano H, Kojima K, Ogino N, et al. Postoperative recurrence and risk factors of colorectal cancer perforation. *Int J Colorectal Dis.* 2017;32:419-24
6. Cheynel N, Cortet M, Lepage C, et al. Incidence, patterns of failure, and prognosis of perforated colorectal cancers in a well-defined population. *Dis Colon Rectum.* 2009;52:406-11
7. Ogawa M, Watanabe M, Eto K, et al. Clinicopathological features of perforated colorectal cancer. *Anticancer Res.* 2009;29:1681-84
8. Honoré C, Goéré D, Souadka A, et al. Definition of patients presenting a high risk of developing peritoneal carcinomatosis after curative surgery for colorectal cancer: A systematic review. *Ann Surg Oncol.* 2013;20:183-92
9. Carraro PG, Segala M, Orlotti C, Tiberio G. Outcome of large bowel perforation in patients with colorectal cancer. *Dis Colon Rectum.* 1998;11:1421-26
10. Viganò L, Lopci E, Costa G, et al. Positron emission tomography-computed tomography for patients with recurrent colorectal liver metastasis: Impact on restaging and treatment planning. *Ann Surg Oncol.* 2017;24:1029-36
11. Tanaka T, Kawai Y, Kanai M, et al. Usefulness of FDG-positron emission tomography in diagnosing peritoneal recurrence of colorectal cancer. *Am J Surg.* 2002;184:433-36
12. Audollet R, Eveno C, Dohan A, et al. Pitfalls and mimickers on ¹⁸F-FDG-PET/CT in peritoneal carcinomatosis from colorectal cancer: An analysis from 37 patients. *J Visc Surg.* 2015;152:285-91
13. Nakajo M, Jinnouchi S, Tateno R, Nakajo M. ¹⁸F-FDG PET/CT findings of a right subphrenic foreign-body granuloma. *Ann Nucl Med.* 2006;20:553-56
14. Rosenbaum SJ, Lind T, Antoch G, Bockisch A. False-positive FDG PET uptake – the role of PET/CT. *Eur Radiol.* 2006;16:1054-65
15. Pantiora EV, Kontis EA, Michalaki V, et al. Granuloma mimicking local recurrence on PET/CT after liver resection of colorectal liver metastasis: A case report. *Cureus.* 2016;8:e171
16. Sarikaya I, Bloomston M, Povoski SP, et al. FDG-PET scan in patients with clinically and/or radiologically suspicious colorectal cancer recurrence but normal CEA. *World J Surg Oncol.* 2007;5:64
17. Orii T, Okumura M, Yoshimura M, et al. An FDG-PET/CT-positive lesion mimicking local recurrence of colon cancer 5 years after radical colectomy. *Am J Case Rep.* 2015;16:149-52
18. Kim SW, Shin HC, et al. Foreign body granulomas simulating recurrent tumors in patients following colorectal surgery for carcinoma: A report of two cases. *Korean J Radiol.* 2009;10:313-18
19. Matsuura S, Sasaki K, Kawasaki H, et al. Silk suture granuloma with false positive findings on PET/CT accompanied by peritoneal metastasis after colon cancer surgery. *Int J Surg Case Rep.* 2016;28:22-25
20. Kobayashi H, Kotake K, Funahashi K, et al. Clinical benefit of surgery for stage IV colorectal cancer with synchronous peritoneal metastasis. *J Gastroenterol.* 2014;49:646-54
21. Kobayashi H, Kotake K, Sugihara K. Outcome of surgery without HIPEC for synchronous peritoneal metastasis from colorectal cancer: Data from a multi-center registry. *Int J Clin Oncol.* 2014;19:98-105
22. Shida D, Tsukamoto S, Ochiai H, Kanemitsu Y. Long-term outcomes after R0 resection of synchronous peritoneal metastasis from colorectal cancer without cytoreductive surgery or hyperthermic intraperitoneal chemotherapy. *Ann Surg Oncol.* 2018;25:173-78
23. Hashiguchi Y, Muro K, Saito Y, et al. Japanese Society for the Colon and Rectum (JSCCR) guidelines 2019 for the treatment of colorectal cancer. *Int J Clin Oncol.* 2019;25:1-42
24. Nagata H, Ishihara S, Hata K, et al. Survival and prognostic factors for meta-chronous peritoneal metastasis in patients with colon cancer. *Ann Surg Oncol.* 2017;24:1269-80

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