Laparoscopically resected perivascular epithelioid cell tumor of the ascending colon demonstrating submucosal tumor morphology: a case report

Yuzo Nagai (✉ yunagai-ty@umin.ac.jp)

Department of Colorectal Surgery, National Center for Global Health and Medicine <https://orcid.org/0000-0002-8415-5661>

Tomomichi Kiyomatsu

Kokuritsu Kenkyu Kaihatsu Hojin Kokuritsu Kokusai Iryo Kenkyu Center

Ayako Kume

Kokuritsu Kenkyu Kaihatsu Hojin Kokuritsu Kokusai Iryo Kenkyu Center

Atsuko Kataoka

Kokuritsu Kenkyu Kaihatsu Hojin Kokuritsu Kokusai Iryo Kenkyu Center

Yoshimasa Gohda

Kokuritsu Kenkyu Kaihatsu Hojin Kokuritsu Kokusai Iryo Kenkyu Center

Kensuke Otani

Kokuritsu Kenkyu Kaihatsu Hojin Kokuritsu Kokusai Iryo Kenkyu Center

Katsuya Deguchi

Kokuritsu Kenkyu Kaihatsu Hojin Kokuritsu Kokusai Iryo Kenkyu Center

Case report

Keywords: Colon, PEComa, Perivascular epithelioid cell tumor, SMT, submucosal tumor, surgery

Posted Date: August 7th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-53502/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License. [Read Full License](#)

Abstract

Background: The differential diagnosis for a colonic submucosal tumor (SMT) can include many types of cancer. We report a case of a perivascular epithelioid cell tumor (PEComa), a rare mesenchymal neoplasm that demonstrates SMT morphology, in the ascending colon.

Case presentation: A mass was incidentally detected by computed tomography (CT) in a 53-year-old man. Colonoscopy revealed an SMT with central ulceration in the ascending colon, and 18F-fluoro-2-deoxy-D-glucose positron emission tomography CT demonstrated a high maximum standardized uptake value of 7.33. Preoperative diagnosis was inconclusive. Given the malignant potential of the tumor, we performed a laparoscopic right hemicolectomy with D3 lymph node dissection. The tumor was 5.5 cm × 4.1 cm and located in the submucosa and muscular propria. There was no lymph node metastasis (0/46). Based on the positive immunohistochemical stainings of both melanocytic (HMB45) and muscle (desmin) markers, we diagnosed the tumor as a PEComa. In the 17 months since surgical resection, the patient has not experienced recurrence, but careful observation should continue because of the malignant potential of the tumor.

Conclusions: Although rare, a PEComa should be considered in the differential diagnosis of colonic SMT. Immunohistochemical staining of melanocytic and muscle markers is useful for the diagnosis.

Background

A colonic submucosal tumor (SMT) constitutes various differential diagnoses including gastrointestinal stromal tumor (GIST), neuroendocrine tumor, smooth muscle tumor, schwannoma, malignant lymphoma, and primary or metastatic colon cancer¹. We report a case of perivascular epithelioid cell tumor (PEComa) demonstrating SMT morphology in the ascending colon. PEComa is a rare mesenchymal neoplasm with a particular immunohistochemical profile³. We also summarize previous colonic PEComa cases and investigate their clinicopathological characteristics.

Case Presentation

A 53-year-old man with cough and fever but no abdominal symptoms underwent computed tomography (CT), and a mass was incidentally discovered in the right intra-abdominal region. After referral to our hospital, a contrast-enhanced CT showed a 50 mm mass with heterogeneous enhancement (Fig. 1A) and a 10 mm regional lymph node (Fig. 1B). A subsequent colonoscopy showed an SMT with central ulceration in the ascending colon (Fig. 1C). 18F-fluoro-2-deoxy-D-glucose (FDG) positron emission tomography CT demonstrated a high maximum standardized uptake value of 7.33 (Fig. 1D). A biopsy taken during the colonoscopy did not provide adequate tumor specimens for pathological investigation. Given the malignant potential of the tumor, we performed a laparoscopic right hemicolectomy with D3 lymph node dissection².

Macroscopic examination revealed a 5.5 cm × 4.1 cm tumor located in the submucosa and muscular propria, protruding into the mucosal and serous surfaces (Figs. 2A and 2B). Central ulceration was confirmed, and the surgical resection margin was negative. There was no lymph node metastasis (0/46). Histopathological assessment of the tumor cells showed abundant clear cytoplasm and trabecular, nested architecture (Fig. 3A). The initial diagnosis was GIST, but immunohistochemical staining of CD117 was weak (Fig. 3B). Additional immunohistochemical staining of CD34 (Fig. 3C), S-100 (Fig. 3D), MyoD1 (Fig. 3E), and SMA (Fig. 3F) were negative; however, HMB45 (Fig. 3G) was strongly positive, and desmin (Fig. 3H) was partially positive. We diagnosed the tumor as a PEComa based on the co-expression of melanocytic (HMB45) and muscle (desmin) markers³. The histology of the specimen showed a high nuclear grade and cellularity, and the mitotic rate was zero. Both tumor necrosis and lymphovascular invasion were positive, and the Ki-67 index was 13% (Fig. 3I). There has been no tumor recurrence in the 17 months since the surgical resection.

Discussion And Conclusions

PEComa is a rare mesenchymal neoplasm defined by the World Health Organization in 2002 as a “mesenchymal tumors composed of histologically and immunohistochemically distinctive perivascular epithelioid cells”⁴. As was seen in our case, a diagnosis can be made by melanocytic markers such as HMB-45 and Melan A and the muscle markers SMA and desmin.

The difficulty of obtaining a sufficient tumor sample makes the preoperative diagnosis of SMT challenging, particularly in the right-sided colon. Endoscopic ultrasound-guided fine-needle aspiration (EUS-FNA) has recently improved the ability to diagnose SMT; however, EUS-FNA for right-sided colon lesions is still technically complicated and not standardized^{5,6}. In our case, a biopsy taken during colonoscopy did not yield a sufficient tumor sample for preoperative diagnosis.

When a biopsy cannot be performed, images can determine the treatment strategy. In our case, the images indicated a potential malignancy according to guidelines presented in the literature⁷: a large tumor size (> 5 cm), heterogeneous enhancement in CT, high FDG accumulation, and central tumor ulceration. The discovery of a swollen 10 mm regional lymph node further suggested the possibility of malignancy. These findings provided compelling evidence to perform surgery for both diagnostic and therapeutic purposes, and we did a minimally invasive laparoscopic procedure to perform systematic tumor resection and lymph node dissection.

We did a literature search using PubMed to investigate the clinicopathological features of colonic PEComa and found 21 primary cases, including that of our patient^{8–24}. These are summarized in Table 1. The median age was 36 years (range: 7–62 years), and the percentage of females was 61.9%, suggesting that the patients were predominantly younger and female, as reported in a recent systematic review of GI PEComa³. The tumors were found equally on both sides of the colon (right side: 11 cases and left side: 10 cases). The tumors were large (median: 4.8 cm, range: 1.2–10.0 cm), and most patients were symptomatic (85.7%). Preoperative diagnosis of colonic PEComa was difficult in most cases, and only one patient had a suspected PEComa from the specimen obtained

under colonoscopy¹³. There was diversity in the extent of surgical resection and lymph node dissection, which could be explained by the difficulty of preoperative diagnosis.

Table 1
Reported cases of primary colonic PEComa

Year	Age / Sex	Symptom	Site	Size (cm)	Preoperative diagnosis of PEComa	Mitosis (/ 50 HPF)	Necrosis	LVI	Metastasis at diagnosis	Surgical treatment	Adjuvant therapy	Recurrence
2004 8	35/ F	None	C	4.0	-	-	-	NS	-	Hemicolectomy	-	-
2004 9	36/ F	Bleeding	C	3.5	-	< 5	+	NS	-	Hemicolectomy	NS	NS
2006 10	43/ F	Abdominal pain	D	8.0	-	2	-	+	-	Partial colectomy	-	PD
2007 11	16/ F	Bleeding	T	2.0	-	0	-	NS	-	Partial colectomy	-	-
2008 12	16/ F	Bleeding	T	1.8	NS	NS	-	-	-	Hemicolectomy	-	-
2008 13	11/ M	Bleeding	S	1.2	Suspected	Occasional	Occasional	+	-	Partial colectomy	-	-
2008 14	11/ M	Bleeding	D	3.5	-	Infrequent	Infrequent	NS	-	Partial colectomy	-	NS
2009 15	43/ F	Abdominal pain, bleeding, diarrhea	C	1.5	-	< 3	-	-	-	Hemicolectomy	-	NS
2010 16	17/ F	Bleeding	S	6.0	-	Low	NS	NS	-	Sigmoidectomy	-	-
2010 18	45/ F	Abdominal pain, bleeding	A	3.5	-	Low	-	NS	-	Partial colectomy	-	-
2010 18	36/ M	Abdominal pain, bleeding	D	4.8	-	Low	NS	NS	-	Partial colectomy	-	-
2010 18	42/ M	Abdominal pain, bleeding	S	4.5	-	1 to 2	-	NS	-	Partial colectomy	-	-
2010 18	38/ F	Abdominal pain, bleeding	A	6.0	-	Low	-	NS	-	Partial colectomy	-	-
2010 17	7/ M	Abdominal pain, bleeding	A	4.0	-	Low	-	-	-	Hemicolectomy	IFN- α	-
2012 19	62/ F	Bleeding	S	5.0	-	NS	NS	NS	-	Anterior resection	-	-
2012 20	62/ F	Abdominal pain, bleeding	S	5.0	-	0	-	NS	-	Partial colectomy	-	-
2013 21	23/ M	Abdominal pain, bleeding	C	5.5	-	60	60%	NS	LN, liver	Hemicolectomy, hepatectomy	Sirolimus	Local, liver
2016 22	40/ M	Dyschezia	S	7.0	NS	0	-	-	-	Sigmoidectomy	-	Local, pancreas
2016 23	42/ F	None	D	5.0	-	NS	NS	NS	-	Hemicolectomy	-	-
2018 24	36/ F	Abdominal pain, bleeding	T	10.0	-	NS	NS	NS	-	Partial colectomy	NS	NS
Our case	53/ M	None	A	5.5	-	0	+	+	-	Hemicolectomy	-	-

F, female; M, male; C, cecum; A, ascending colon; T, transverse colon; D, descending colon; S, sigmoid colon; NS, not specified; LVI, lymphovascular invasion; L, interferon; PD, peritoneal dissemination

Forpe et al. proposed guidelines for malignant potential in GI PEComa: >5 cm, infiltrative, high nuclear grade and cellularity, mitotic rate > 1/50 HPF, necrosis, and vascular invasion²⁵. One patient with a large tumor (5.5 cm), high mitotic rate (60/50 high-power fields), and 60% tumor necrosis had lymph node and liver metastases at initial diagnosis²¹. Our patient has not experienced recurrence during the 17 months after surgery, although we had concerns because he met five of Forpe's six criteria to predict malignancy. Follow-up should be continued because information regarding disease pathology and prognosis is limited. More cases with longer follow-up periods are needed to predict the prognosis of colonic PEComa, although this will be difficult because of the rarity of the tumor.

In conclusion, PEComa, although rare, should be considered in the differential diagnosis of colonic SMT. Immunohistochemical staining of melanocytic and muscle markers is useful for the diagnosis, although preoperative diagnosis is difficult. Image findings could indicate a malignant potential. More research and case reports are needed to provide guidance for effective PEComa surgery and long-term care.

Abbreviations

SMT, submucosal tumor; GIST, gastrointestinal stromal tumor; PEComa, perivascular epithelioid cell tumor; CT, computed tomography; FDG, fluoro-2-deoxy-D-glucose; EUS-FNA, Endoscopic ultrasound-guided fine-needle aspiration.

Declarations

Ethics approval and consent to participate:

Not applicable.

Consent for publication

Written informed consent was obtained from the patient to publish this case report.

Availability of data and materials

Not applicable.

Competing interests:

The authors have no competing interests to declare.

Funding:

Not applicable.

Authors' contributions:

YN and KT made study conception and design. AK performed the histological examination. AK, YG, KO and KD participated in the patient's surgical treatment. YN is the major contributor in writing the manuscript. All authors read and approved the final manuscript.

Acknowledgements:

Not applicable.

References

1. Nishida T, Kawai N, Yamaguchi S, Nishida Y. Submucosal tumors: comprehensive guide for the diagnosis and therapy of gastrointestinal submucosal tumors. *Dig Endosc*. 2013;25:479–89.
2. Watanabe T, Muro K, Ajioka Y, et al. Japanese Society for Cancer of the Colon and Rectum (JSCCR) guidelines 2016 for the treatment of colorectal cancer. *Int J Clin Oncol*. 2018;23:1–34.
3. Chen Z, Han S, Wu J, et al. A systematic review: perivascular epithelioid cell tumor of gastrointestinal tract. *Medicine*. 2016;95:e3890.
4. Fletcher CDM, Unni KK, Mertens F. World Health Organization Classification of Tumours: Pathology and Genetics of Tumours of Soft Tissue and Bone. Lyon: IARC Press; 2002.
5. Nguyen-Tang T, Shah JN, Sanchez-Yague A, Binmoeller KF. Use of the front-view forward-array echoendoscope to evaluate right colonic subepithelial lesions. *Gastrointest Endosc*. 2010;72:606–10.

6. Sasaki Y, Niwa Y, Hirooka Y, et al. The use of endoscopic ultrasound-guided fine-needle aspiration for investigation of submucosal and extrinsic masses of the colon and rectum. *Endoscopy*. 2005;37:154–60.
7. Nishida T, Blay JY, Hirota S, Kitagawa Y, Kang YK. The standard diagnosis, treatment, and follow-up of gastrointestinal stromal tumors based on guidelines. *Gastric cancer: official journal of the International Gastric Cancer Association the Japanese Gastric Cancer Association*. 2016;19:3–14.
8. Birkhaeuser F, Ackermann C, Flueckiger T, et al. First description of a PEComa (perivascular epithelioid cell tumor) of the colon: report of a case and review of the literature. *Dis Colon Rectum*. 2004;47:1734–7.
9. Genevay M, Mc Kee T, Zimmer G, Cathomas G, Guillou L. Digestive PEComas: a solution when the diagnosis fails to "fit". *Annals of diagnostic pathology*. 2004;8:367–72.
10. Yamamoto H, Oda Y, Yao T, et al. Malignant perivascular epithelioid cell tumor of the colon: report of a case with molecular analysis. *Pathology international*. 2006;56:46–50.
11. Baek JH, Chung MG, Jung DH, Oh JH. Perivascular epithelioid cell tumor (PEComa) in the transverse colon of an adolescent: a case report. *Tumori*. 2007;93:106–8.
12. Cho HY, Chung DH, Khurana H, Zhai QJ, Ro JY. The role of TFE3 in PEComa. *Histopathology*. 2008;53:236–49.
13. Pisharody U, Craver RD, Brown RF, Gardner R, Schmidt-Sommerfeld E. Metastatic perivascular epithelioid cell tumor of the colon in a child. *J Pediatr Gastroenterol Nutr*. 2008;46:598–601.
14. Righi A, Dimosthenous K, Rosai J. PEComa: another member of the MiT tumor family? *Int J Surg Pathol*. 2008;16:16–20.
15. Qu GM, Hu JC, Cai L, Lang ZQ. Perivascular epithelioid cell tumor of the cecum: a case report and review of literatures. *Chin Med J*. 2009;122:1713–5.
16. Freeman HJ, Webber DL. Perivascular epithelioid cell neoplasm of the colon. *World J Gastrointest Oncol*. 2010;2:205–8.
17. Park SJ, Han DK, Baek HJ, et al. Perivascular epithelioid cell tumor (PEComa) of the ascending colon: the implication of IFN- α 2b treatment. *Korean journal of pediatrics*. 2010;53:975–8.
18. Shi HY, Wei LX, Sun L, Guo AT. Clinicopathologic analysis of 4 perivascular epithelioid cell tumors (PEComas) of the gastrointestinal tract. *Int J Surg Pathol*. 2010;18:243–7.
19. Cho YW, Kim KJ, Ye BD, et al. [A case of a perivascular epithelioid cell tumor mimicking colon cancer]. *The Korean journal of gastroenterology = Taehan Sohwagi Hakhoe chi*. 2012;60:377–81.
20. Lee M, Cho KJ, Yu C, et al. Perivascular epithelioid cell tumor of the sigmoid colon with transcription factor E3 expression. *Annals of diagnostic pathology*. 2012;16:306–11.
21. Scheppach W, Reissmann N, Sprinz T, Schippers E, Schoettker B, Mueller JG. PEComa of the colon resistant to sirolimus but responsive to doxorubicin/ifosfamide. *World journal of gastroenterology*. 2013;19:1657–60.
22. Cheng J, Deng M, Gao J, Tao K. A recurrent perivascular epithelioid cell tumor of sigmoid colon with pancreatic metastasis: an extremely rare case report and review of the literature. *Int J Colorectal Dis*. 2016;31:1237–40.
23. Iwamoto R, Kataoka TR, Furuhashi A, et al. Perivascular epithelioid cell tumor of the descending colon mimicking a gastrointestinal stromal tumor: a case report. *World J Surg Oncol*. 2016;14:285.
24. Neuhaus L, Probst A, Messmann H, et al. Invagination as Manifestation of a Perivascular Epithelioid Cell Neoplasm (PEComa) of the Colon. *Am J Gastroenterol*. 2018;113:1115.
25. Folpe AL, Mentzel T, Lehr HA, Fisher C, Balzer BL, Weiss SW. Perivascular epithelioid cell neoplasms of soft tissue and gynecologic origin: a clinicopathologic study of 26 cases and review of the literature. *Am J Surg Pathol*. 2005;29:1558–75.

Figures

Figure 1

Image findings: Contrast-enhanced CT showed (A) 50 mm mass with heterogeneous enhancement and (B) 10-mm regional lymph node (yellow arrow). (C) Colonoscopy revealed an SMT with central ulceration in the ascending colon. (D) Positron emission tomography CT demonstrated a maximum standardized uptake value of 7.33. CT, computed-tomography; SMT, submucosal tumor.

Figure 2

Image findings: Contrast-enhanced CT showed (A) 50 mm mass with heterogeneous enhancement and (B) 10-mm regional lymph node (yellow arrow). (C) Colonoscopy revealed an SMT with central ulceration in the ascending colon. (D) Positron emission tomography CT demonstrated a maximum standardized uptake value of 7.33. CT, computed-tomography; SMT, submucosal tumor.

Figure 3
Histological and immunohistological findings. (A) Hematoxylin and eosin staining: immunohistochemical staining of (B) CD117, (C) CD34, (D) S100, (E) MyoD1, (F) SMA, (G) HMB45, (H) desmin, and (I) Ki-67.