Discover Oncology

Case Report

Synchronous triple primary colorectal cancer: a rare case report from a rural tibetan population

Qing Zhou[1] · Jin-ke Kang[1] · Yong-fa Zhi[1] · Ming-jie Ma[1] · Xiao-de Ren[1] · Zheng-ning Gan[2] · Jie Niu[3]

Received: 14 January 2025 / Accepted: 9 May 2025
Published online: 21 May 2025

Abstract
Synchronous multiple colorectal cancers (SMCRC) are rare and defined as distinct malignant tumors occurring simultaneously in the colon and rectum without evidence of metastasis from one tumor to another. This case report presents a 69 year-old Tibetan male admitted with acute abdominal pain, abdominal distension, nausea, and vomiting. Imaging studies and colonoscopy revealed synchronous cancers in the rectum, sigmoid colon, and transverse colon, all pathologically confirmed as moderately differentiated adenocarcinomas. The patient underwent a multisegment colectomy with complete resection of all tumors. Postoperative recovery was uneventful, and no recurrence was reported during follow-up. This case underscores the importance of thorough diagnostic and surgical strategies for SMCRC, particularly in emergency presentations where limited diagnostic modalities may pose challenges.

Keywords Synchronous colorectal cancer · SMCRC · Multisegment colectomy · Intraoperative colonoscopy · Tibetan patient

1 Background

Colorectal cancer (CRC) remains one of the leading causes of cancer-related morbidity and mortality worldwide. Globally, CRC accounts for approximately 1.9 million new cases and 935,000 deaths annually, making it the third most commonly diagnosed cancer and the second leading cause of cancer-related deaths [1, 2]. Regional variations exist, with higher incidence rates observed in developed countries due to lifestyle and dietary factors, while lower detection rates in developing regions highlight disparities in access to screening and healthcare resources [3]. SMCRC accounts for approximately 2–5% of CRC cases globally, with certain populations demonstrating a higher risk due to genetic predisposition or environmental factors [4]. These synchronous cancers pose unique challenges in diagnosis and management, requiring precise preoperative evaluation and tailored surgical intervention [5, 6].

Emerging imaging techniques, including PET/CT and MRI colonography, have been increasingly used to improve the preoperative identification of synchronous lesions, especially in cases where conventional colonoscopy is limited by obstruction [7, 8]. Compared to conventional methods, PET/CT provides enhanced sensitivity in detecting metabolically active lesions, including small or occult synchronous tumors that may be missed on CT or colonoscopy [9]. Similarly, MRI colonography offers superior soft tissue contrast, enabling more precise localization and characterization of lesions, particularly in anatomically complex or obstructed regions [10]. However, these advanced techniques

✉ Jie Niu, 22284262@qq.com | [1]Department of Gastrointestinal Surgery, Qinghai Red Cross Hospital, Xi'ning 810000, China. [2]Department of Imaging, Qinghai Red Cross Hospital, Xi'ning 810000, China. [3]Ophthalmology Department III, Xining First People's Hospital, No. 3, Huzhu Lane, Chengzhong District, Xi'ning 810000, Qinghai Province, China.

may be limited by cost, accessibility, and interpretation variability, which can influence their routine application in clinical practice [11]. Additionally, genetic syndromes such as Lynch syndrome or familial adenomatous polyposis (FAP) are associated with increased risk of SMCRC, although sporadic cases remain the most common [12].

All three tumors were confirmed to be synchronous primary adenocarcinomas based on their distinct locations, histopathological features, and absence of transitional mucosal involvement. No distant metastases were detected through preoperative imaging. The rectal and transverse colon tumors were staged as T3N1M0, and the sigmoid lesion as T1N0M0.

2 Case presentation

A 69 year-old Tibetan male presented to the emergency department with abdominal pain, distension, nausea, and vomiting. His medical history included type 2 diabetes mellitus, hypertension, cholecystectomy, and appendectomy. Physical examination revealed abdominal tenderness without rebound pain. Laboratory results showed no significant abnormalities in tumor markers, including carcinoembryonic antigen (CEA).

3 Imaging studies

Abdominal computed tomography (CT) revealed a possible obstructive rectal tumor and a mass in the transverse colon (Fig. 1).

Further evaluation with colonoscopy confirmed the presence of (Fig. 2):

A rectal tumor located approximately 10 cm from the anal verge, causing near-complete luminal obstruction.

A polypoid lesion in the sigmoid colon.

A circumferential mass in the transverse colon, which was not traversable with the colonoscope.

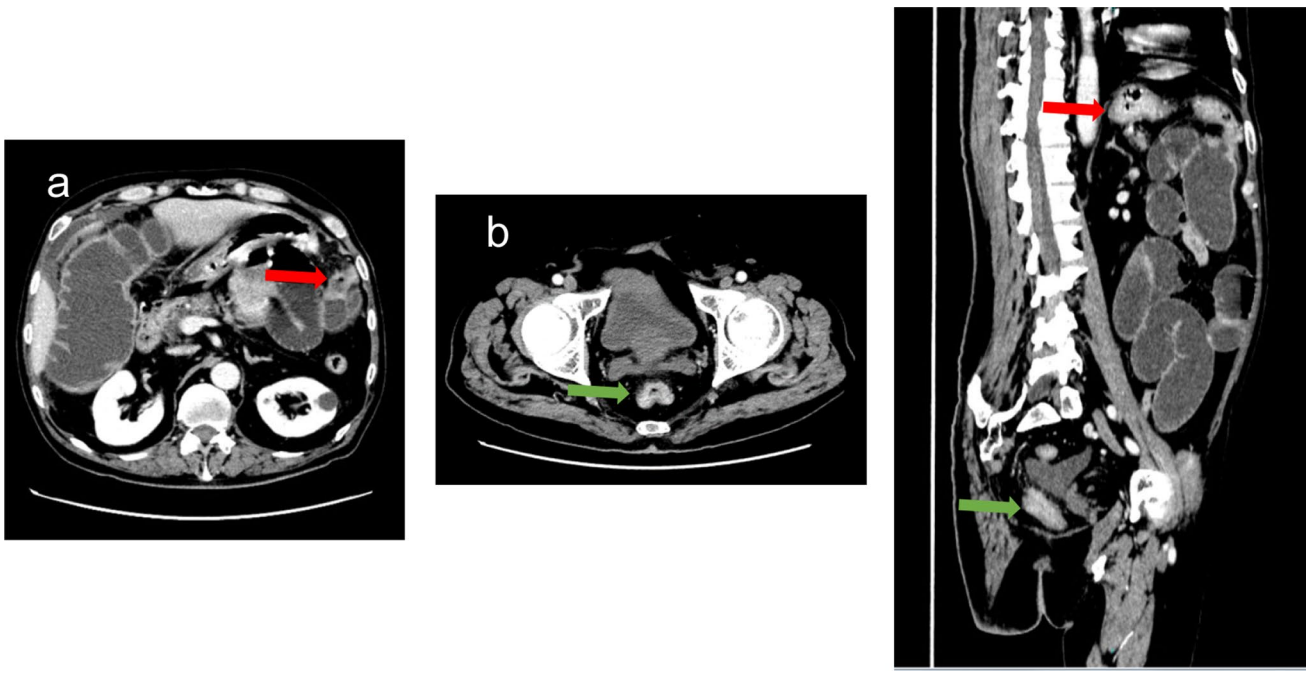

Fig. 1 Abdominal computed tomography (CT) revealed a possible obstructive rectal tumor(green arrow) and a mass in the transverse colon(red arrow). Abdominal computed tomography (CT) imaging

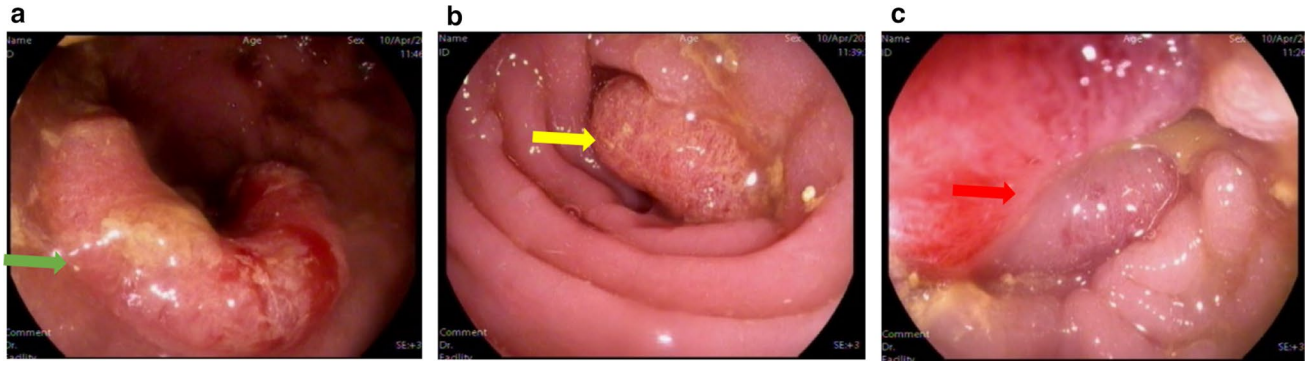

Fig. 2 Further evaluation with colonoscopy confirmed the presence of: **a** A rectal tumor located approximately 10 cm from the anal verge, causing near-complete luminal obstruction(green arrow). **b** A polypoid lesion in the sigmoid colon(yellow arrow). **c** A circumferential mass in the transverse colon, which was not traversable with the colonoscope(red arrow). Electronic Colonoscopy Imaging

4 Surgical intervention

Following the emergent presentation with bowel obstruction, the patient underwent urgent colonoscopy, which confirmed three distinct tumors in the rectum, sigmoid colon, and transverse colon. After the resolution of obstruction symptoms with conservative management, the patient underwent a scheduled tumor resection surgery. The surgical findings included three distinct primary tumors, and resection involved (Fig. 3):

Low anterior resection for the rectal tumor with distal rectal stump closure,
Segmental resection of the sigmoid colon, and
Transverse colostomy following left hemicolectomy for the transverse colon tumor.

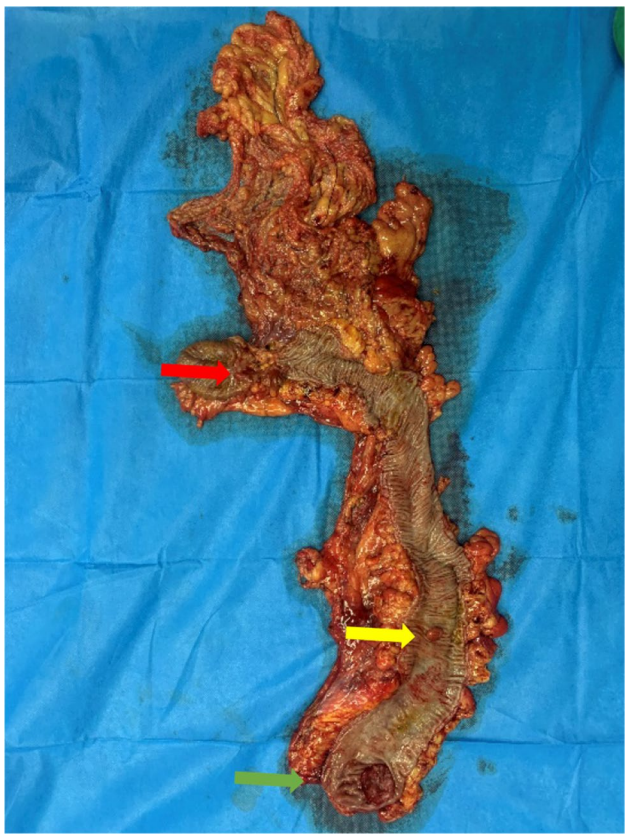

Fig. 3 The specimen consists of a segment of colonic tissue measuring 49 cm in length with a circumference ranging from 5 to 6 cm. Located 2 cm from the rectal resection margin, there is an ulcerative tumor measuring 3.5 × 3.0 × 0.8 cm (indicated by the green arrow), involving approximately half of the circumference of the bowel. On gross examination, the tumor is gray-white, solid, and firm, with poorly demarcated borders, invading the muscularis propria. Surgical resection of tissue display

Intraoperative colonoscopy confirmed no additional lesions.

5 Postoperative course

The patient had an uneventful recovery and was discharged on postoperative day 10. Postoperative treatment included a combination of adjuvant chemotherapy with capecitabine and oxaliplatin administered over six cycles, as well as pembrolizumab immunotherapy given the moderately differentiated adenocarcinoma findings. At three-month follow-up, the patient reported no abdominal pain, and imaging showed no evidence of recurrence. Continued monitoring included regular imaging and tumor marker evaluations as part of the follow-up protocol [13].

6 Pathology

Biopsies from the rectal and transverse colon masses, as well as the sigmoid colon polyp, were all consistent with moderately differentiated adenocarcinoma.

6.1 Rectal tumor

The rectal tumor is consistent with a moderately to poorly differentiated ulcerative adenocarcinoma, measuring $3.5 \times 3.0 \times 0.8$ cm. The tumor invades the deep muscularis propria. No definite tumor emboli are observed in the vasculature, and no evidence of perineural invasion is detected. The tumor budding is graded as high. The rectal resection margin is free of tumor involvement. Immunohistochemical staining reveals the following results: CD34 (positive in vascular endothelial cells), CDX-2 (positive), CEA (focal positive), CK20 (positive), MLH1 (positive), MSH2 (positive), MSH6 (positive), PMS2 (positive), P53 (wild-type expression), Ki67 (proliferation index: 60%), EGFR (2 +), Her2 (0), CK7 (negative), BRAF V600E (negative), D2-40 (positive in lymphatic vessels), and S-100 (positive in nerve bundles).

6.2 Sigmoid colon tumor

The sigmoid colon tumor is consistent with a moderately differentiated nodular adenocarcinoma, measuring $1.7 \times 1.2 \times 0.7$ cm. The tumor invades the submucosa but does not involve the muscularis propria. No tumor emboli are seen in the vasculature, and there is no evidence of perineural invasion. Immunohistochemical staining shows the following results: Calponin (positive in smooth muscle), CDX-2 (positive), Ki67 (proliferation index: 40%), P53 (wild-type expression), and SATB2 (positive).

6.3 Transverse colon tumor

The transverse colon tumor is consistent with a moderately to poorly differentiated ulcerative adenocarcinoma, measuring $4.0 \times 3.7 \times 0.9$ cm. The tumor invades the full thickness of the bowel wall and extends into the pericolonic adipose tissue but does not reach the serosal surface. No tumor emboli are observed in the vasculature, and no perineural invasion is identified. The tumor budding is graded as high. The transverse colon resection margin is free of tumor involvement. Immunohistochemical staining reveals the following results: Calponin (positive in smooth muscle), CDX-2 (positive), Ki67 (proliferation index: 40%), P53 (wild-type expression), and SATB2 (positive).

6.4 Lymph node metastases

Metastatic carcinoma is identified in 1 of 17 lymph nodes from the pericolonic region (associated with the transverse and sigmoid colon) and in 1 of 7 lymph nodes from the perirectal region.

Due to the emergency nature of the presentation and the patient's general condition, primary colorectal anastomosis was not performed. Instead, a transverse colostomy was created to reduce postoperative complications and ensure safe recovery.

These findings are consistent with multifocal colorectal adenocarcinoma with regional lymph node metastases.

7 Discussion

7.1 Diagnostic challenges

In cases of obstructing CRC, incomplete colonoscopy often limits preoperative identification of synchronous lesions [14]. CT colonography or MRI colonography can serve as valuable alternatives, particularly in cases where conventional techniques are inadequate. PET/CT imaging could provide whole-body staging and detect synchronous or metastatic lesions beyond the colon [15]. Additionally, intraoperative colonoscopy plays a critical role in diagnosing proximal lesions beyond the site of obstruction, enabling real-time evaluation and reducing the likelihood of missing synchronous tumors. Despite its utility, CT imaging has limitations in detecting smaller lesions, which highlights the need for comprehensive diagnostic strategies [16].

7.2 Surgical strategy

Surgical resection remains the cornerstone of treatment. Multisegment colectomy was performed in this case to achieve complete oncologic resection while preserving bowel function. While a subtotal colectomy might minimize the risk of future metachronous cancers, it is associated with higher morbidity and potential impacts on quality of life [18].

Intraoperative colonoscopy played a crucial role in confirming complete resection and ensuring no additional synchronous lesions were missed. However, the risks of prolonged surgical time and infection must be considered.

7.3 Molecular and genetic considerations

Differential diagnoses for colorectal cancer complications, including tumor perforation, abscess, and obstruction, should also be considered in emergency cases. A comprehensive understanding of such complications can improve diagnostic accuracy and treatment decisions. For further insight, see: Constantin VD et al. [19] https://doi.org/10.22543/2392-7674.1388.

While molecular testing was not conducted in this case due to the emergent nature of the presentation and prioritization of resolving bowel obstruction, MSI testing or KRAS/NRAS mutation analysis could provide critical insights into tumor biology, guide adjuvant therapy, and help identify familial cancer syndromes. Conducting such tests postoperatively could have helped refine treatment plans and assess the potential hereditary risks for family members. Such evaluations are increasingly recommended for patients presenting with SMCRC [9, 14].

7.4 Prognosis and follow-up

The prognosis for patients with SMCRC depends on tumor staging and completeness of resection. Routine follow-up should include annual colonoscopy, imaging (CT or MRI) every 6–12 months for the first three years, and periodic monitoring of CEA levels. These recommendations align with established guidelines from the American Society of Clinical Oncology (ASCO) and the National Comprehensive Cancer Network (NCCN), which emphasize the importance of early detection of recurrence and metachronous cancers in patients with SMCRC. These measures are essential for early detection of recurrence or metachronous cancers [7].

8 Conclusions

This case underscores the multifaceted challenges of managing SMCRC in emergency presentations, where obstructive symptoms can hinder comprehensive diagnostic evaluation [19]. Optimal management demands a combination of advanced diagnostic modalities, such as PET/CT and MRI colonography, to identify synchronous lesions preoperatively, even in challenging settings. Furthermore, intraoperative exploration and radical resection remain indispensable, ensuring complete oncologic clearance and addressing the anatomical complexities posed by multiple primary tumors. Emphasizing multidisciplinary collaboration and the integration of cutting-edge diagnostic tools can significantly enhance detection accuracy and improve surgical outcomes in such complex cases [12, 17].

Acknowledgements Thank you to my wife J N for her assistance in manuscript writing and editing.

Author contributions Competing Interests The authors declare that they have no competing interests. Authors' Contributions Q.Z., Y.F.Z., and J.K.K. contributed to research design and quality assessment. X.D.R. and M.J.M. contributed to literature search. Z.N.G. provided imaging materials. Q.Z. and J.N. contributed to manuscript writing. Q.Z. and J.K.K., as co-first authors, made equal contributions to this article. All authors read and approved the final manuscript.

Funding This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Data availability Data is provided within the manuscript or supplementary information files.

Declarations

Ethics approval and consent to participate This study did not involve experiments on humans or animals that required ethical approval. Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Consent for publication Written informed consent for publication, including individual details, images, and videos, was obtained from the patient.

Competing interests The authors declare no competing interests.

References

1. Ferlay J, Mora E, Varughese FM, et al. Global cancer observatory: cancer today. Int J Cancer. 2020;149:778–89.
2. Dekker E, Tanis PJ, Vleugels JLA, et al. Colorectal cancer. Lancet. 2019;394(10207):1467–80.
3. Siegel RL, Miller KD, Jemal A, et al. Colorectal cancer statistics, 2020. CA Cancer J Clin. 2020;70(3):145–64.
4. Guinney J, Dienstmann R, Wang X, et al. The consensus molecular subtypes of colorectal cancer. Nat Med. 2015;21(11):1350–6.
5. Bray F, Ferlay J, Soerjomataram I, et al. Global cancer statistics 2018: GLOBOCAN estimates. CA Cancer J Clin. 2018;68(6):394–424.
6. Vannella L, Lahner E, Annibale B, et al. Role of imaging techniques for colorectal cancer. World J Gastroenterol. 2021;27(6):564–77.
7. Arnold M, Sierra MS, Laversanne M, et al. Global patterns and trends in colorectal cancer incidence. Gut. 2017;66(4):683–91.
8. Stoffel EM, Boland CR, Lynch HT, et al. Hereditary colorectal cancer syndromes. Nat Rev Gastroenterol Hepatol. 2015;12(9):540–50.
9. Latchford AR, Neale K, Phillips RK, et al. Familial adenomatous polyposis management. Colorectal Dis. 2020;22(1):36–46.
10. Doubeni CA, Corley DA, Quinn VP, et al. Effectiveness of screening colonoscopy. Ann Intern Med. 2018;169(1):1–8.
11. Labianca R, Beretta GD, Kildani B, et al. Adjuvant therapy for colon cancer. Ann Oncol. 2013;24(Suppl 6):vi64–70.
12. Network CGA. Comprehensive molecular characterization of colorectal cancer. Nature. 2012;487:330–7.
13. Petrelli F, Trevisan F, Cabiddu M, et al. Survival analysis of adjuvant chemotherapy in colon cancer. JAMA Oncol. 2017;3(5):603–8.
14. Gandaglia G, Karakiewicz PI, Briganti A, et al. PET imaging for colorectal cancer staging. J Nucl Med. 2020;61(3):331–40.
15. Gollub MJ, Lakhman Y, Ream J, et al. MRI in rectal cancer treatment planning. Radiology. 2019;291(3):660–74.
16. Duffy MJ, Lamerz R, Haglund C, et al. CEA as a marker in colorectal cancer. Clin Chem. 2014;60(9):1171–6.
17. Watanabe T, Muro K, Ajioka Y, et al. Guidelines for the treatment of colorectal cancer. Int J Clin Oncol. 2018;23(1):1–34.
18. Chang GJ, You YN, Ruff S, et al. Surgical approaches for SMCRC. Ann Surg Oncol. 2019;26(7):1983–90.
19. Constantin VD, et al. Diagnosis and management of colon cancer patients presenting in advanced stages of complications. J Mind Med Sci. 2023;10(1):51–65.