

Perforated Poorly Differentiated Large-Cell Neuroendocrine Carcinoma of the Colon With Peritoneal Implants: A Case Report

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Abstract

Colonic neuroendocrine carcinomas (NECs) are rare, poorly differentiated neoplasms with high proliferative activity and a poor prognosis. Presentation with tumour perforation and peritoneal dissemination is uncommon and has been described only in isolated reports. A 59-year-old man with no relevant medical history presented with a two-week history of abdominal pain, weight loss, and subocclusive symptoms. Contrast-enhanced CT demonstrated marked thickening of the ascending colon extending to the hepatic flexure, with locoregional lymphadenopathy, small-volume ascites and no pneumoperitoneum. Urgent laparotomy revealed a perforated tumour with a right upper quadrant abscess and widespread peritoneal implants. A right hemicolectomy with end ileostomy and colonic mucous fistula was performed. Histopathology showed a 9 cm poorly differentiated large-cell NEC of the colon (Ki-67 90%, 34 mitoses/10 high-power fields), positive for CK8/18 and focally for synaptophysin, with lymphovascular invasion, 18 of 19 metastatic lymph nodes, tumour in the appendiceal wall, and a histologically confirmed peritoneal metastasis (pT4a pN2b pM1c, stage IVC). The postoperative course was uneventful. Following multidisciplinary discussion, first-line systemic platinum-based chemotherapy was proposed; however, the patient subsequently relocated abroad and was lost to follow-up. This case illustrates an uncommon, complicated presentation of colonic NEC in a patient with no prior oncological history. Resection without anastomosis achieved source control and provided the diagnosis; tumour morphology, rather than the Ki-67 index alone, distinguished NEC from well-differentiated NET G3. NEC should be considered in the differential diagnosis of rapidly progressive colonic tumours presenting with complications.

Categories: General Surgery, Emergency Medicine

Keywords: case report, colon, high-grade neoplasms, neuroendocrine carcinoma, perforation, peritoneal implants, poorly differentiated neuroendocrine carcinoma

Introduction

Neuroendocrine neoplasms (NENs) of the gastrointestinal tract range from well-differentiated neuroendocrine tumors (NETs), which are often indolent, to poorly differentiated neuroendocrine carcinomas (NECs), which are highly aggressive [1,2]. Colorectal NECs are rare: in a large single-institution series they accounted for 0.6% of colorectal cancers, and around 70% of patients had metastatic disease at presentation [3].

The current WHO classification (sixth edition, 2026) defines NECs as poorly differentiated, high-grade neoplasms, subdivided into small-cell and large-cell types [2,4]. A Ki-67 index above 20% does not by itself establish the diagnosis, as it is also found in well-differentiated NET G3; the two are distinguished by morphology [2,4,5]. This matters because their prognosis and treatment differ [5].

Unlike some well-differentiated NETs, which may present with hormonal syndromes, NECs are almost always non-functional. Nonspecific symptoms such as abdominal pain, weight loss, and altered bowel habits frequently result in delayed diagnosis and advanced-stage presentation [6].

Perforation as the presenting complication of colonic NEC is rare and has been documented only in isolated case reports [7]. We report a case of a perforated, poorly differentiated large-cell NEC of the right colon with an associated abscess and widespread peritoneal implants, managed with emergency resection. This case adds to the limited literature in three respects: perforation with abscess was the first manifestation of disease in a previously asymptomatic patient; it illustrates operative decision-making in the presence of sepsis, peritoneal dissemination and an unknown histological diagnosis; and it shows the importance of morphology, rather than the Ki-67 index alone, in classifying a high-grade colonic neuroendocrine neoplasm under the current WHO framework. This report was prepared in accordance with the CAsE REport (CARE) guidelines.

Case Presentation

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Patient information

A 59-year-old man presented to the emergency department with no relevant past medical, surgical, or oncological history. He reported no known family history of colorectal cancer or NENs. No prior gastrointestinal investigations or interventions had been performed.

Clinical findings

The patient reported a two-week history of progressively worsening abdominal pain, unintentional weight loss, nausea, vomiting, and obstipation. On admission, he was febrile temperature 38 °C (reference value: 36.5–37.5 °C), blood pressure 100/80 mmHg (reference value: <120/80 mmHg), heart rate 90 beats per minute (reference value: 60–100 beats per minute), and peripheral oxygen saturation 97% on room air (reference value: ≥95%). On physical examination, the abdomen was distended and diffusely tender, most prominently in the right upper quadrant, without signs of generalised peritonitis. Bowel sounds were reduced. No palpable masses or hernias were identified.

Diagnostic assessment

Laboratory investigations showed hemoglobin 9.2 g/dL (reference range: 13–17 g/dL), white blood cell count $15.1 \times 10^9/L$ (reference range: $4.0\text{--}10.0 \times 10^9/L$) and C-reactive protein (CRP) of up to 28 mg/dL on serial testing (reference value: <0.34 mg/dL). Tumor markers were not obtained prior to surgery given the urgency of presentation.

Contrast-enhanced CT of the abdomen and pelvis demonstrated marked irregular thickening of the entire ascending colon, with a soft-tissue component extending into the fat around the hepatic flexure, suspicious for a neoplastic process (Figures [1](#), [2](#)).

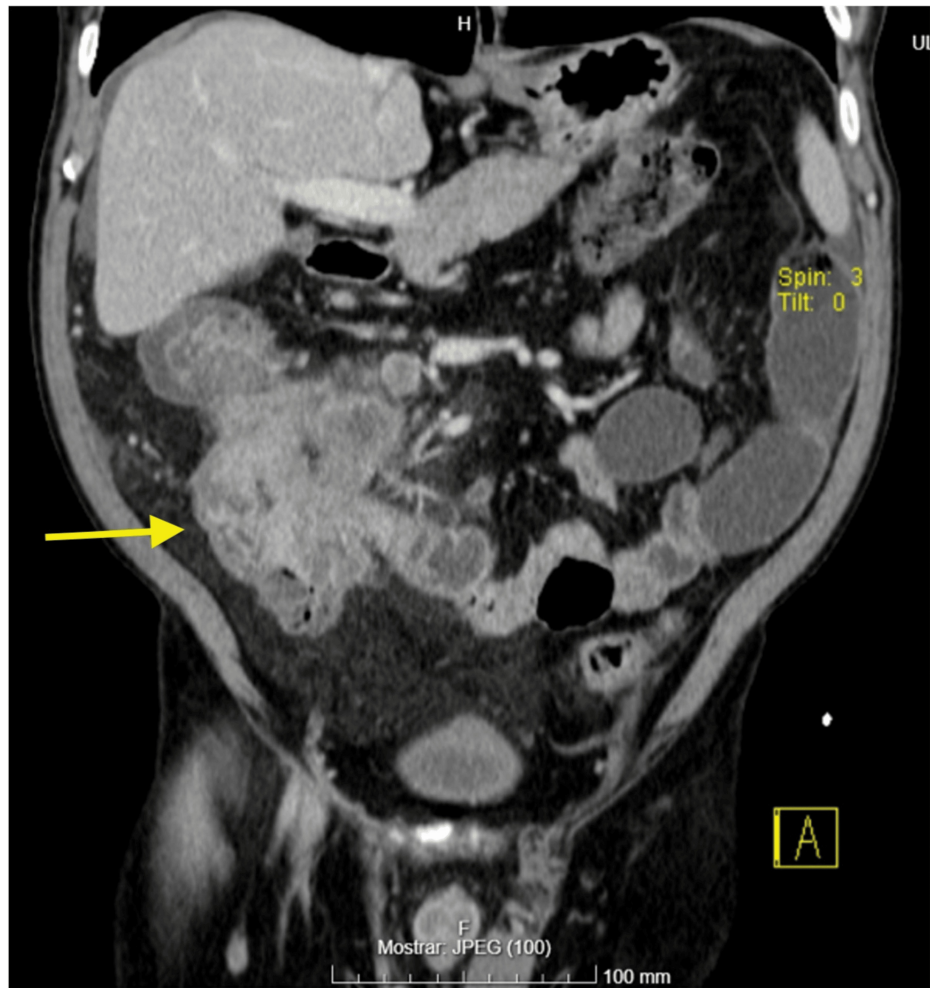


FIGURE 1: Coronal contrast-enhanced CT of the abdomen and pelvis

The arrow indicates the obstructive tumor of the ascending colon extending to the hepatic flexure, with associated bowel-wall thickening and adjacent inflammatory fat stranding.

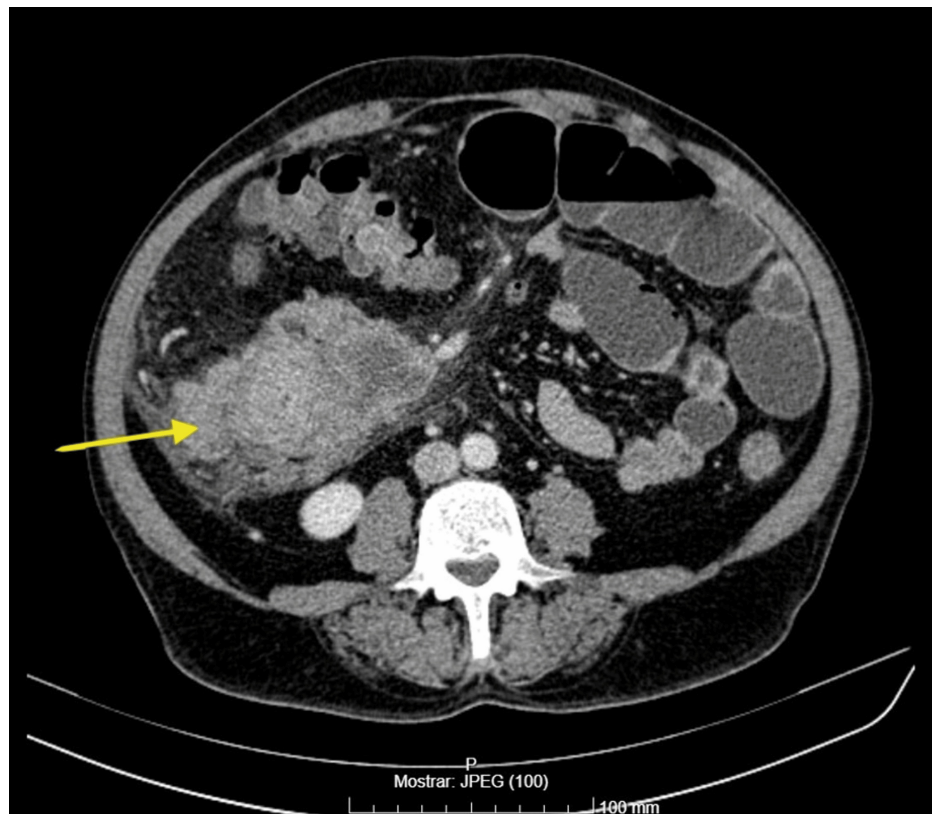


FIGURE 2: Axial contrast-enhanced CT at the level of the hepatic flexure

The arrow indicates the same obstructive mass, demonstrating wall thickening and loss of the normal fat plane.

A 4 cm area with a collected appearance was seen on the medial and superior aspect of the lesion, and locoregional lymphadenopathy was present. The ileum was dilated upstream, reaching 44 mm in calibre, and there was a small amount of ascites in all peritoneal recesses and no visible pneumoperitoneum. A 10 mm right juxtadiaphragmatic nodule was noted.

The differential diagnosis at this stage included colorectal adenocarcinoma (most common; the degree of obstruction and CT morphology were consistent), gastrointestinal stromal tumor (GIST) (considered but less likely given the mucosal involvement and lymphadenopathy pattern), colonic lymphoma (possible given the wall thickening but no systemic lymphoma features), and NEN (lower index of suspicion preoperatively given the rarity of colonic primaries). The definitive diagnosis was established by postoperative histopathological and immunohistochemical analysis.

Therapeutic interventions

Given the obstructive presentation, the systemic inflammatory response and the imaging findings, the patient underwent urgent exploratory laparotomy on the day of presentation. The patient became hemodynamically unstable during the procedure and required intraoperative vasopressor support, which was not required postoperatively. Intraoperatively, a large obstructive neoplasm of the right colon, extending from the caecum to the hepatic flexure, was identified with a localised tumor perforation and an associated right upper quadrant abscess and intra-abdominal infection. Widespread peritoneal implants were noted throughout the abdominal cavity. A peritoneal implant was excised for histological examination, and ascitic fluid was sampled for cytology.

A right hemicolectomy was performed to control the source of sepsis, relieve the obstruction and obtain a histological diagnosis. Given the peritoneal dissemination, the resection was not curative in intent, and no cytoreduction was attempted. Because of the abscess and intra-abdominal infection, together with hemodynamic instability requiring vasopressors, primary anastomosis was avoided, and an end ileostomy with a colonic mucous fistula was created.

Pathological findings

The resected specimen contained a 9 × 6 cm ulcerated, stenosing tumor of the cecum at the ileocecal valve, occupying the entire circumference and reducing the lumen by about 90% (Figure 3).



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FIGURE 3: Gross surgical specimen following right hemicolectomy (opened, mucosal surface)

Ulcerated, vegetating, stenosing tumor with surrounding haemorrhage. Ruler markings are in centimetres.

Histology showed a poorly differentiated large-cell neuroendocrine carcinoma with focal necrosis, arranged in solid nests and sheets of cells with vesicular nuclei, conspicuous nucleoli and moderate cytoplasm (Figure 4).

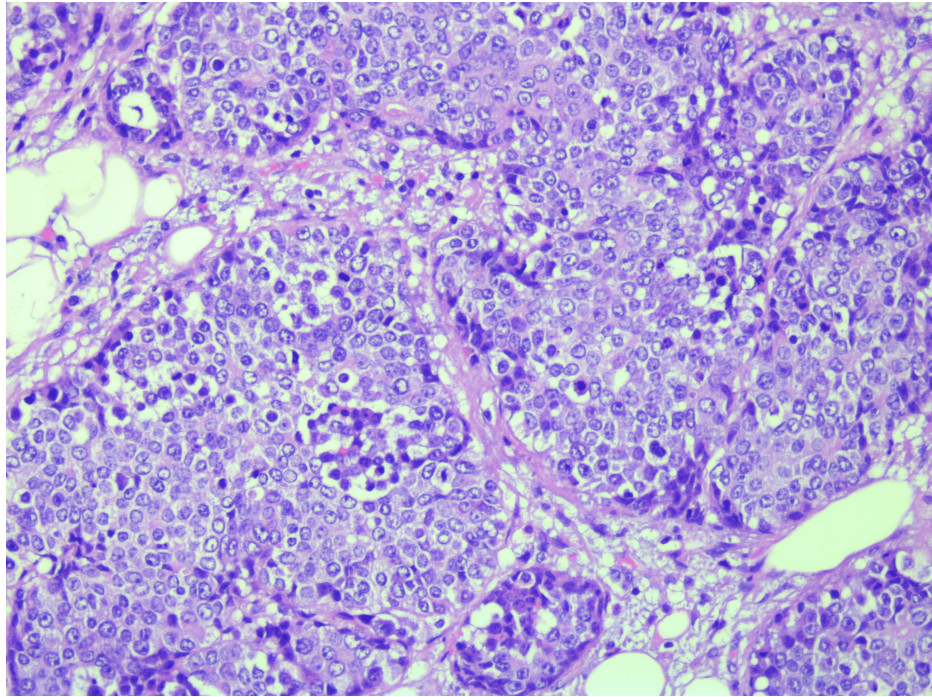


FIGURE 4: Haematoxylin and eosin staining of the tumor

Poorly differentiated large-cell neuroendocrine carcinoma growing in solid nests and sheets separated by thin fibrovascular septa, with peripheral palisading. The tumor cells have round to oval nuclei with vesicular chromatin, conspicuous nucleoli and moderate cytoplasm; mitotic figures and apoptotic bodies are frequent (H&E, original magnification $\times 200$).

The tumor focally reached the serosa, with lymphovascular invasion and multiple tumor deposits. Tumor cells were positive for CK8/18 and focally for synaptophysin, and negative for chromogranin A and CD56 (Figures 5, 6); the Ki-67 index was 90% (Figure 7) and the mitotic count 34 per 10 high-power fields (HPF).

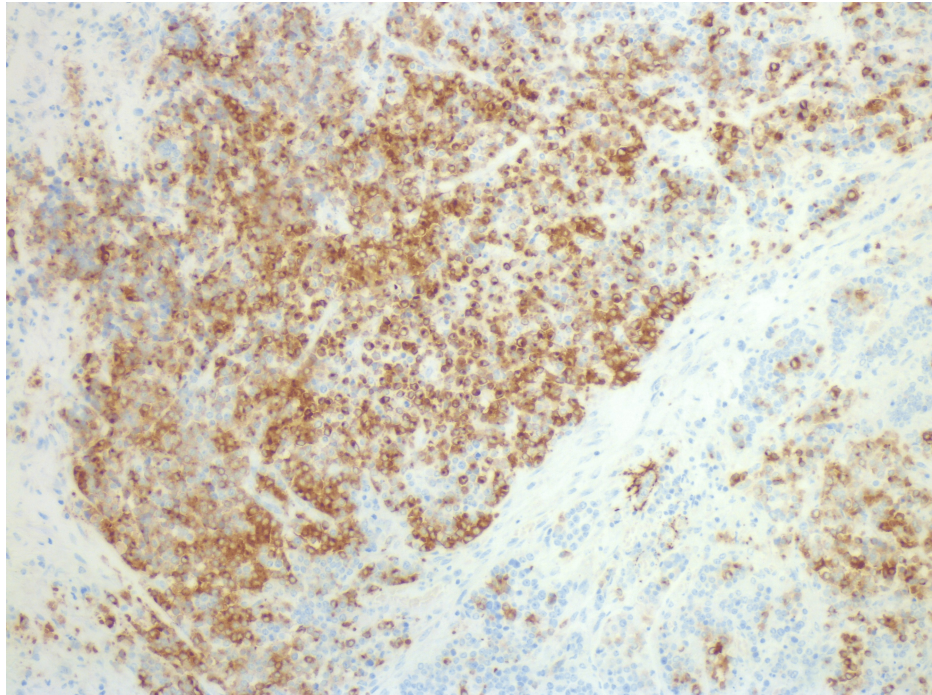


FIGURE 5: Immunohistochemistry of the tumor - Synaptophysin

Focal cytoplasmic positivity for synaptophysin (original magnification $\times 100$).

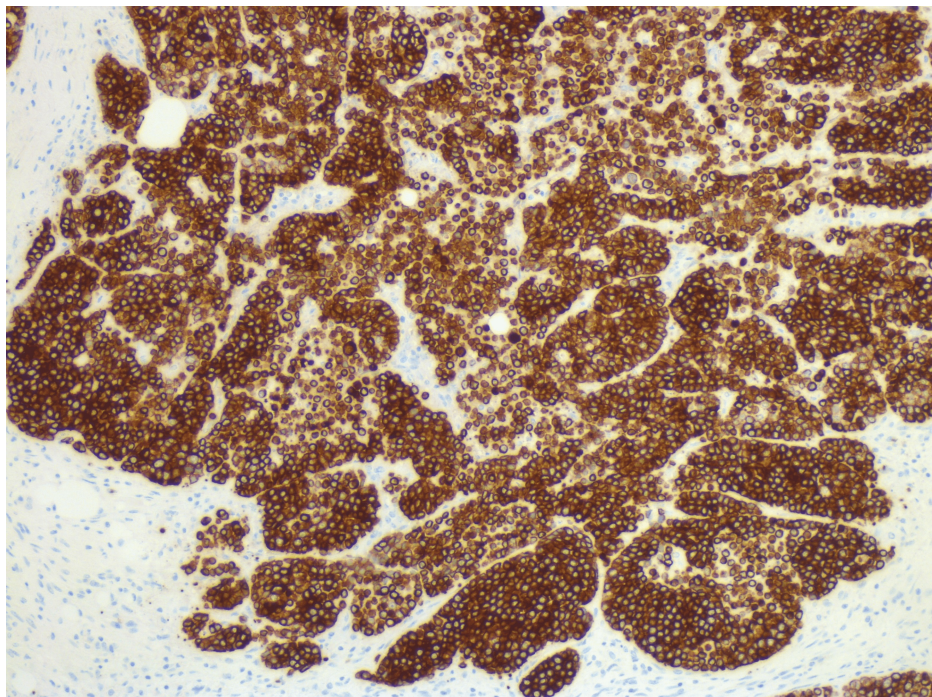


FIGURE 6: Immunohistochemistry of the tumor - CK8/18

Diffuse strong positivity for CK8/18 (original magnification $\times 100$).

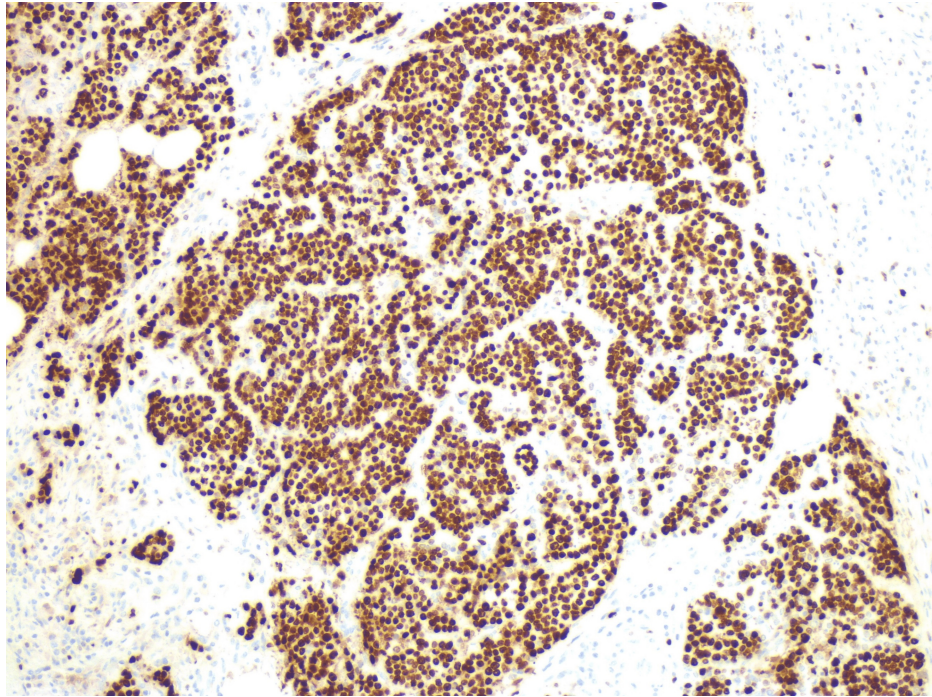


FIGURE 7: Ki-67 proliferation index

Nuclear Ki-67 staining in approximately 90% of tumor cells (original magnification $\times 100$).

Eighteen of 19 lymph nodes were involved, and vascular invasion was present at both resection margins (R1). The tumor also infiltrated the appendix, and the excised peritoneal implant confirmed metastatic NEC; ascitic fluid cytology was negative. The final stage was pT4a pN2b pM1c, stage IVC (American Joint Committee on Cancer (AJCC) and Union for International Cancer Control (UICC) 8th edition) [8,9].

Follow-up and outcomes

The immediate postoperative period was uneventful. The patient was managed with antimicrobial therapy, nutritional support, and early mobilization. Because his social circumstances did not allow a safe discharge, he remained in hospital, and intestinal continuity was restored on postoperative day 31 with a stapled side-to-side isoperistaltic ileocolic anastomosis. This second operation was also uneventful, and he was discharged on the 15th day after it (day 46 after the index operation). He subsequently underwent physical rehabilitation.

Postoperative staging CT of the thorax showed no thoracic lymphadenopathy or pleural effusion; an indeterminate 5 mm right lower lobe nodule and a possible prominent 11 $\times$ 6 mm right supradiaphragmatic lymph node were noted. Fluorodeoxyglucose-positron emission tomography (FDG-PET) was requested, as somatostatin receptor imaging is of limited value in NEC. After multidisciplinary team (MDT) discussion, first-line platinum-based chemotherapy was proposed for metastatic disease [10]. The patient subsequently relocated abroad and was lost to follow-up; whether chemotherapy was administered, the FDG-PET result and the subsequent outcome could not be ascertained. The clinical timeline is summarized in Table 1.

Time point	Event
Day 0	Presentation to the emergency department with a two-week history of abdominal pain, weight loss and subocclusive symptoms; temperature 38 °C, haemoglobin 9.2 g/dL, white blood cell count 15.1 × 10 ⁹ /L; contrast-enhanced CT of the abdomen and pelvis
Day 0	Urgent laparotomy: perforated tumor with abscess and widespread peritoneal implants; intraoperative vasopressor support; right hemicolectomy, end ileostomy and colonic mucous fistula
Postoperative period	Uneventful recovery; staging CT of the thorax; patient kept in hospital for social reasons
Day 31	Restoration of intestinal continuity (stapled side-to-side isoperistaltic ileocolic anastomosis); uneventful
Day 46	Discharge (15th day after the second operation)
After discharge	Final histopathology: poorly differentiated large-cell NEC, pT4a pN2b (18/19) pM1c (histologically confirmed peritoneal metastasis), stage IVC
After discharge	MDT discussion: first-line platinum-based chemotherapy proposed; FDG-PET requested
Subsequently	Patient relocated abroad and was lost to follow-up

TABLE 1: Timeline of the clinical course
CT, computed tomography; NEC, neuroendocrine carcinoma; MDT, multidisciplinary team; FDG-PET, fluorodeoxyglucose positron emission tomography; pT4a pN2b pM1c, pathological TNM classification (p, pathological; T, tumor; N, node; M, metastasis).

Discussion

Colorectal NECs are rare and biologically aggressive malignancies. They grow rapidly and metastasise early: in the series by Bernick et al., 69% of patients had metastatic disease at diagnosis and median survival was 10.4 months [3], and in the NORDIC NEC study of advanced gastrointestinal NEC, median overall survival was 11 months with chemotherapy and 1 month without treatment [6]. The absence of hormonal functionality means that patients rarely present with paraneoplastic syndromes, and diagnosis is typically delayed until symptoms of obstruction, bleeding, or - as in this case - perforation arise.

Perforation of a colonic NEC is uncommon, and only isolated cases have been reported (Table 2).

Study	Age/sex	Site	Presentation	Surgery	Stage	Systemic therapy / outcome
Alshammari et al., 2019 [7]	57/M	Splenic flexure	Contained perforation, 1.5 L pus	Subtotal colectomy, ileostomy	pT4N2bM1c (peritoneal)	Referred to MDT; outcome not reported
Nainar et al., 2025 [11]	66/M	Ileocaecal junction	Perforation with peritonitis and septic shock (vasopressors); suspected liver and adrenal metastases	Emergency limited right hemicolectomy, end ileostomy, mucous fistula	pT4a N0 Mx; small-cell NEC	Carboplatin–etoposide proposed; died ~2 weeks after discharge
Khanna et al., 2022 [12]	83/M	Ascending colon	Large bowel obstruction; liver metastases	Emergency right hemicolectomy, primary anastomosis	pT3N1M1b	Anastomotic leak; died on day 30
Kim et al., 2018 [13]	74/M	Sigmoid colon	Pain, diarrhoea, haematochezia; pelvic peritoneal seeding	Elective anterior resection, peritonectomy (CC-0), intraperitoneal chemotherapy	T4a, 13/20 nodes, peritoneal	Cisplatin–etoposide ×8; no recurrence at 3 years
Present case	59/M	Caecum/ascending colon to hepatic flexure	Perforation with abscess and intra-abdominal infection; widespread peritoneal implants	Urgent right hemicolectomy, end ileostomy, mucous fistula	pT4a pN2b pM1c (peritoneal)	Platinum-based chemotherapy proposed; lost to follow-up

TABLE 2: Published cases of complicated colonic neuroendocrine carcinoma requiring surgery, compared with the present case
M, male; NEC, neuroendocrine carcinoma; MDT, multidisciplinary team; CC-0, completeness of cytoreduction score 0 (no residual disease).

Alshammari et al. described a perforated splenic-flexure NEC with peritoneal metastasis, treated with subtotal colectomy and ileostomy [7], and Nainar et al. described a perforated small-cell NEC of the ileocaecal junction with septic shock, treated with resection and end ileostomy; that patient died two weeks after discharge [10]. Khanna et al. reported a fatal anastomotic leak after emergency right hemicolectomy for an obstructing large-cell NEC [11]. In contrast, Kim et al. reported three-year disease-free survival after elective cytoreduction for limited peritoneal disease [13]. The present case adds a further perforated right-colon NEC with peritoneal dissemination, managed with resection and diversion.

The mechanism of perforation may reflect tumor necrosis, as rapid proliferation outpaces the vascular supply, combined with transmural invasion that weakens the bowel wall; proximal distension from the obstruction may have contributed. The histologically confirmed peritoneal metastasis, appendiceal involvement and metastases in 18 of 19 lymph nodes indicate that the disease was already disseminated at presentation.

The diagnosis rested on the poorly differentiated morphology, supported by high mitotic activity (34/10 HPF) and a Ki-67 index of 90%; a Ki-67 index above 20% alone would not have distinguished NEC from NET G3 [2,4]. A Ki-67 index above 55% is associated with shorter survival [5,6] but higher response rates to platinum-based chemotherapy [6]. Positivity for CK8/18 and focal synaptophysin without chromogranin A or CD56 expression is recognised in NECs, in which marker expression is often incomplete [14].

Resection without anastomosis was chosen to control the septic source and obtain a diagnosis, while avoiding the risk of anastomotic leak in a haemodynamically unstable patient with intra-abdominal infection. Cytoreductive surgery with intraperitoneal chemotherapy has been reported in selected patients with limited peritoneal disease from colorectal NEC [12], but the evidence is limited to isolated reports, it is not included in European Neuroendocrine Tumor Society (ENETS) recommendations [10], and it was not appropriate in this emergency setting.

Treatment recommendations for advanced digestive NEC are largely extrapolated from small-cell lung cancer. The ENETS 2023 guidance recommends platinum-based chemotherapy (cisplatin or carboplatin) combined with etoposide as first-line treatment for metastatic disease [10,15]. In this patient, because of the peritoneal metastases, chemotherapy would be systemic treatment of stage IV disease rather than adjuvant therapy. Because the patient was lost to follow-up after relocating abroad, this report cannot provide information on treatment or its outcome.

Regarding functional imaging, expression of somatostatin receptors is typically low or absent in NECs, limiting the diagnostic and therapeutic utility of somatostatin receptor PET and peptide receptor radionuclide therapy (PRRT). Fluorodeoxyglucose-Positron Emission Tomography (FDG-PET) and conventional cross-sectional imaging are generally preferred for staging and surveillance in this context [10]. Multidisciplinary management - involving surgery, medical oncology, pathology, and radiology - should be established early.

This report has limitations. It describes a single case; the patient was lost to follow-up after relocating abroad, so data on systemic treatment, treatment response and long-term outcome are not available. Its findings cannot be generalised to colonic NEC as a whole.

Conclusions

This case illustrates a rare and highly aggressive presentation of poorly differentiated colonic NEC with perforation, abscess, and peritoneal implants in a patient with no prior oncological history. Resection without anastomosis achieved source control and provided the definitive diagnosis; tumor morphology, rather than the Ki-67 index alone, distinguished NEC from well-differentiated NET G3. Clinicians should consider NEC in the differential diagnosis of rapidly progressive colonic tumors, particularly when complicated by perforation. Because the patient was lost to follow-up and no treatment-response data are available, no conclusion about the effect of subsequent oncological treatment can be drawn from this case. The rarity of this presentation highlights the need for registries and collaborative data collection to better define optimal management of colonic NECs.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Ines Borges da Costa

Acquisition, analysis, or interpretation of data: Ines Borges da Costa

Drafting of the manuscript: Ines Borges da Costa

Critical review of the manuscript for important intellectual content: Ines Borges da Costa

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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