CASE REPORT

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Dome-type carcinoma of the rectum mimicking a submucosal tumor: a case report and literature review

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Dome-type carcinoma (DC) has been recognized as a rare variant of adenocarcinoma, which arises in gut-associated lymphoid tissue. It has a specific morphologic feature of a dome-like protrusion associated with lymphoid tissue. We report a case of a DC of the rectum in an asymptomatic 58-year-old male. A 2-cm sized, well-demarcated, round mass masquerading as a submucosal tumor (SMT) was identified in the rectum and was resected by endoscopic submucosal dissection. The tumor was revealed as an adenocarcinoma with submucosal invasion of 3,700 μm, which consisted of dilated cystic glands and the lymphoid stroma with reactive germinal centers. On immunohistochemistry, the tumor cells revealed retained expression for mismatch repair proteins. Laparoscopic surgical resection was subsequently performed. DC is considered a distinctive subtype of colorectal adenocarcinoma with characteristic morphology and low-grade malignant potential. Careful detection of the overlying mucosal lesion is crucial to differentially diagnose DC from SMT.

Keywords: Colorectal neoplasms, Adenocarcinoma, Carcinoma, Lymphoid tissue, Morphology

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INTRODUCTION

The digestive system has the largest mass of lymphoid tissue, which comprises tonsils, Peyer's patches, lymphoid follicles in the large intestine, and so on. Mucosal tissues are sites of intense immunological activity as well as digestion and absorption [1]. The mucosa-associated lymphoid tissue is characterized by the presence of lymphoid follicles [1] and is termed gut-associated lymphoid tissue (GALT) in the intestine. GALT mucosa is scattered throughout the intestine and accounts for a tiny fraction of a whole colorectal mucosa [2,3].

Dome-type carcinoma (DC) has been proposed as a rare variant of colorectal adenocarcinoma arising in GALT [4,5]. To our knowledge, less than 20 cases have been reported until now [6]. Specific morphologic features include macroscopically dome-like expansive growth, and microscopically dilated malignant glands on a dense lymphoid background and the lack of goblet cells [5,7]. A dome-like mass that bulges into the lumen can be easily confused with a submucosal tumor (SMT). Also, as the rarity of cases or a lack of awareness, this particular subset of colorectal carcinoma may be likely to be underdiagnosed.

We report a case of DC of the rectum, and present the histological and immunohistochemical features along with a literature review.

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CASE REPORT

A 58-year-old male patient was admitted to the department of internal medicine for assessment of a rectal tumor found on the periodic health examination. He had no noticeable symptom and medical or family history except for a previous colon tubular adenoma. His clinical physical examination was unremarkable and laboratory findings were normal. The colonoscopy identified a mucosa-covered protruding, round mass with a shallow erosion originating from the rectum (Fig. 1A). The endoscopic ultrasound showed a well-demarcated heterogeneous and hyperechoic SMT, measuring approximately 1.6 × 1.6 cm, emanating from the mucosal layer of the rectum (Fig. 1B). Clinically, tentative differential diagnoses of SMT were made including a neuroendocrine tumor (NET), ectopic pancreas, or gastrointestinal stromal tumor (GIST). Thus, endoscopic biopsy was not performed. The patient underwent endoscopic submucosal dissection (ESD).

On microscopy after ESD, pathological examination revealed a well-delimited expansile tumor, measuring 1.6 × 1.6 × 0.4 cm, invading the submucosa and mimicking SMT (Fig. 2A). The overlying mucosa demonstrated from normal epithelium to dysplasia and well-differentiated adenocarcinoma. The submucosal lesion is mainly comprised of centrally cribriform and peripherally dilated cystic glands, surrounded by a conspicuous lymphocytic infiltration with reactive germinal centers. Desmoplasia was not observed. The neoplastic glands were composed of pseudostratified cuboidal to columnar and mucin-depleted (absence of goblet cells) epithelial cells with eosinophilic cytoplasm and vesicular

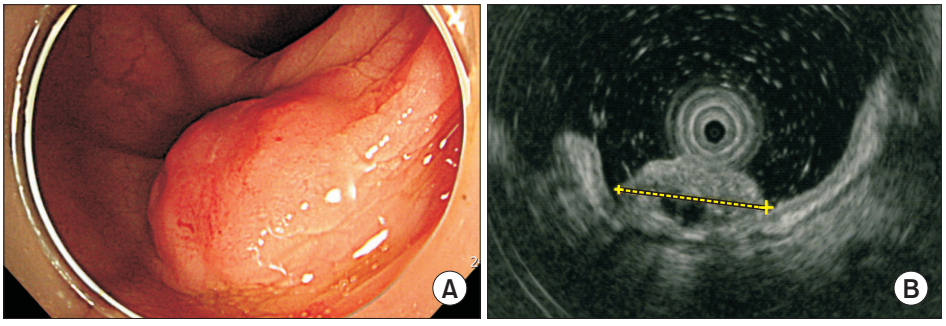

Fig. 1. (A) Colonoscopy identifies a mucosa-covered, protruding, round mass with shallow erosion, originating from the rectum. (B) Endoscopic ultrasound shows a well-demarcated, heterogeneous, and hyperechoic submucosal mass, emanating from the mucosal layer of the rectum.

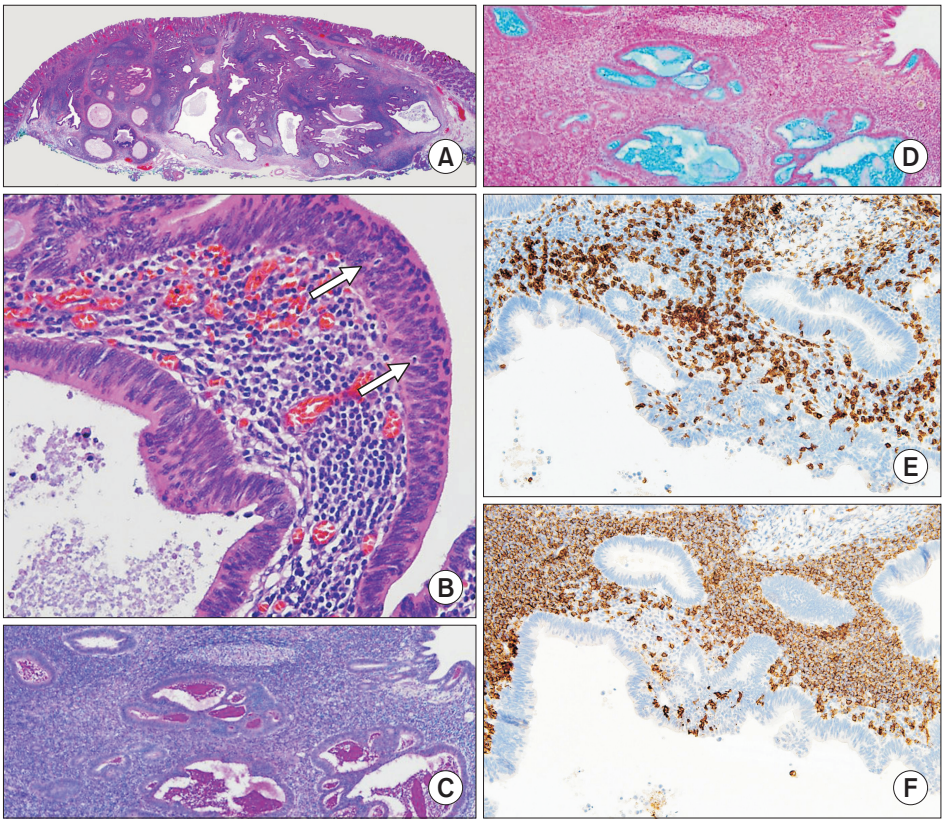

Fig. 2. (A) The microscopic pathological examination reveals a well-delimited expansile tumor, measuring 1.6 × 1.6 × 0.4 cm, invading the submucosa (H&E stain, ×12.5). (B) The neoplastic glands are composed of pseudostratified cuboidal to columnar and mucin-depleted (absence of goblet cells) epithelial cells with eosinophilic cytoplasm and vesicular nuclei. Focal tumor-infiltrating lymphocytes and intraluminal pink material from the neoplastic glands are also noted (H&E stain, ×200). (C, D) The pink material shows intensive periodic acid–Schiff-diastase-positive (C, ×40) and Alcian blue-positive staining (D, ×40). (E, F) The tumor-infiltrating lymphocytes consist of mixed CD3- (E, ×200) and CD20-positive cells (F, ×200).

nuclei. Focal tumor-infiltrating lymphocytes (TILs) (Fig. 2B, arrows), and intraluminal pink materials of the neoplastic glands were also noted. These pink materials including mucin, fibrin, and cellular debris showed intensively periodic acid–Schiff-diastase-positive and Alcian blue-positive staining (Fig. 2C and D, respectively).

On immunohistochemistry, the tumor cells revealed retained expression for mismatch repair proteins and MSH2, and negative immunoreactivity for MUC1, MUC2, MUC5AC, and MUC6. *In situ* hybridation for Epstein-Barr virus (EBV)-encoded small RNA-1 was negative. These findings delineate this lesion was irrelevant to microsatellite instability and EBV-associated disease. TILs consisted of mixed B- and T-cells, verified by CD3- and CD20-positive cells, without nuclear atypia (Fig. 2E and F, respectively). Diffuse strong immunopositivity for p53 was also identified.

The tumor was revealed as DC but was adenocarcinoma with a submucosal invasion of 3,700 μm. Subsequently, laparoscopic low anterior resection was performed. On the final pathologic examination, neither lymphovascular nor perineural invasion was identified. There was no metastasis in 17 regional lymph nodes. Postoperatively, the patient was followed up without recurrence for 5 years.

DISCUSSION

GALT is characterized by the presence of lymphoid follicles which are distributed throughout the intestine and increase in frequency in the distal ileum and colon where the microbial flora is abundant [1]. However, taken as a whole colorectal mucosa, the vast majority is covered by columnar and goblet cells, and the other tiny area consists of scattered GALT [2,3]. Nearly all colorectal cancers develop in GALT-free mucosal area, and very rarely in GALT-associated mucosa [3,6]. Thus, the latter is termed GALT carcinoma or DC because of its protruding shape [2,4]. Rubio et al. [2] proposed GALT carcinoma as the broader concept, which includes protruding (DC) and non-protruding phenotypes.

The villus epithelium contains absorptive enterocytes, mucin-secreting goblet cells, and enteroendocrine cells, and functions as protection, digestion, and absorption [1]. In contrast, the follicle-associated epithelium contains few or no goblet or enteroendocrine cells but contains specialized M cells that transport samples of foreign material from the lumen to organized lymphoid tissues within the mucosa. The M cells have the ability to engulf and deliver antigens to antigen-presenting cells as a so-called mucosal immune barrier [6].

To date, about 20 cases pertaining to DC or GALT carcinoma, including this case, have been reported in the English medical literature. DCs may occur as a sporadic cancer or in conjunction with other inflammatory or genetic environment such as ulcerative colitis, familial adenomatous polyposis, and Lynch syndrome [3,6]. The size of DCs ranges from 0.5 to 3.0 cm (1.74 cm on average), and most cases were reported in the early stage, i.e. Tis or T1 lesions confined to the submucosa except only two cases without lymph node metastasis. DCs have been clarified as microsatellite-stable lesions, except for one case associated with HNPCC [2], and are not related to EBV infection.

The lymphoid aggregates throughout the intestine may form dome-like masses which bulge into the lumen [5]. DC has distinct morphological features including the nonpolypoid appearance, dilated or cribriform glands with intraluminal eosinophilic materials, stromal lymphoid cells with reactive germinal centers, no desmoplasia, and cytological non-mucinous columnar epithelium. Other features such as a preexisting associated adenoma, foci of usual-type adenocarcinoma, the intraglandular necrosis, and the TILs may be present or absent [6,8].

In the present case, ESD was performed directly without mucosal biopsy based on the impression of SMT. Endoscopically, DC needs to be differentiated from SMT. The overlying mucosa of DC is mostly lined by from normal to dysplastic or malignant epithelial cells. The detection of mucosal dysplastic epithelium would help to discriminate DC from SMT [9]. However, DC may lack erosion or ulceration and an area of mucosal dysplasia could be detected on the top of the lesion [10]. Thus, differential diagnoses of well-circumscribed submucosal lesion should include not only ectopic pancreas, NET, and GIST but also DC.

We guess that DC lacks an aggressive behavior because advanced case is rare and neither lymph node metastasis nor recurrence has been reported so far. However, it is uncertain whether endoscopic treatment or local surgical excision is curable for DC. More cases and longer follow-up are required to come to an agreement. Deep submucosal invasion of 3,700 μm formed the determining cause of subsequent radical surgery in the present case.

In conclusion, DC is considered as a distinctive subtype of colorectal cancer with characteristic morphology and low-grade malignant potential. The delicate detection of the overlying mucosal lesion is crucial to differentially diagnose DC mimicking SMT. Awareness and increasing the knowledge of this lesion needs to prevent underdiagnosis and improve management.

NOTES

Ethical statement

This study was approved by the Institutional Review Board of Kyung Hee University Hospital with a waiver of informed consent (No. 2022-02-047), and we followed the principles of the Declaration of Helsinki for health research ethics.

Author's contributions

Conceptualization: BJN, SJP, YWK
Data curation, Formal analysis: BJN, SJP
Investigation, Methodology: BJN, SJP, JYJ, YWK
Project administration: SJP, YWK
Visualization: BJN, JYJ, YWK
Writing–original draft: BJN, SJP
Writing–review & editing: BJN, SJP
All authors read and approved the final manuscript.

Conflict of interest

Sun Jin Park is the editor-in-chief of *Journal of Minimally Invasive Surgery*. He was not involved in the review process of this article. There is no other conflict of interest.

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