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Jejunal Carcinoma Successfully Detected by Capsule Endoscopy and Balloon Endoscopy: A Case Report

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Abstract

A 67-year-old male was admitted to our institution for occult blood positivity and to test for anemia. Upper and lower gastroenteroscopy revealed no abnormal findings. A thickened intestinal wall was detected in the upper jejunum by contrast-enhanced abdominal computed tomography, and a small intestinal tumor was suspected. Capsule endoscopy revealed a lesion protruding two-thirds of its circumference into the upper jejunal wall, which showed a stricture. Single-balloon endoscopy confirmed a jejunal tumor. A specimen biopsied during single-balloon endoscopy revealed a well-differentiated tubular adenocarcinoma. Therefore, the patient was treated surgically. The intraoperative findings revealed a jejunal tumor approximately 5 cm distal from the Treiz ligament, and the jejunum, including the tumor with a 5 cm margin, was partially resected. The resected tumor was 60×40×30 mm in size. Pathological examination revealed a well-differentiated tubular adenocarcinoma with invasion of the serosa and no vessel or lymphatic invasion. With the advent of capsule endoscopy and balloon endoscopy, it has become possible to visualize small intestinal mucosa and detect disease in the small intestine. We present the case of a male patient with a jejunal carcinoma that was successfully detected by capsule endoscopy and balloon endoscopy.

Introduction

Small intestinal tumors are extremely rare and usually found at an advanced stage with some clinical symptoms or signs. In recent years, with the advent of Capsule Endoscopy (CE), an increasing number of small intestinal tumors are detected at an early stage, even before the appearance of clinical symptoms or signs. Therefore, CE is efficient in detecting small intestinal tumors at an early stage. Moreover, with the advent of Balloon Endoscopy (BE), it has become possible to confirm the diagnosis of small intestinal tumors by endoscopic biopsies. With BE, it is also possible to perform an endoscopic intervention in the small intestine. According to guidelines, CE should be considered for Obscure Gastrointestinal Bleeding (OGIB). However, retention of the CE capsule because of the presence of a malignant stricture remains a concern. We present the case of a male patient with jejunal carcinoma that was successfully detected by CE and BE.

Case Presentation

A 67-year-old male with a history of type 2 diabetes mellitus was admitted to our institution with occult blood positivity and to test for anemia. His blood pressure was 149/67 mmHg, heart rate was 92 beats/min, and temperature was 36.8°C. Blood chemistry analyses revealed anemia (red blood cell count: 349×10^4/μl; hemoglobin: 8.3 g/dl) and abnormal glucose tolerance (glucose: 270 mg/dl; hemoglobin A1c: 9.8%). In tumor marker analysis, serum carcinoembryonic antigen and serum carbohydrate antigen 19-9 levels were within normal limits. His abdomen was distended, with normal peristalsis. Mild tenderness was present over the upper abdomen. No mass was palpable, and no sign of peritoneal irritation was observed over the abdomen. Plain abdominal radiography revealed normal gas distribution. Upper and lower gastroenteroscopy revealed no abnormal findings except for a small amount of serosanguinous fluid in the terminal ileum and cecum. A thickened intestinal wall was detected in the upper jejunum by contrast-enhanced abdominal Computed Tomography (CT) (Figure 1A), and a small intestinal tumor was suspected. CE revealed a lesion protruding two-thirds of its circumference into the upper jejunal wall, which showed a stricture (Figure 1B). The capsule was retained for a long time at the lesion, and it passed through the stricture and all gastrointestinal tracts. Single-balloon endoscopy confirmed a jejunal tumor (Figures 2A and 2B), and an endoscopic biopsy was performed. Small bowel series performed during the endoscopy revealed an apple core sign in the upper jejunum (Figure 2C). Histopathological examination of the biopsied specimens revealed mild atypical cells with irregular glandular architecture, and well-differentiated tubular adenocarcinoma of the jejunum was diagnosed (Figure 2D). The patient was treated surgically. The intraoperative findings revealed a jejunal tumor approximately 5 cm distal from the Treiz ligament. The jejunum, including the tumor with a 5 cm margin, was partially resected. The resected tumor was 60×40×30 mm in size (Figure 3A). The tumor had invaded the serosa

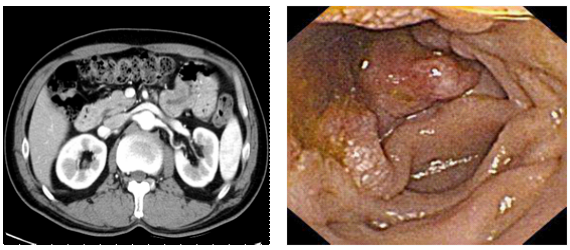

Figure 1: Contrast-enhanced abdominal computed tomography revealed a thickened wall in the upper jejunum (A). Capsule endoscopy (EndoCapsule®) revealed a lesion protruding two-thirds of its circumference into the upper jejunum (B).

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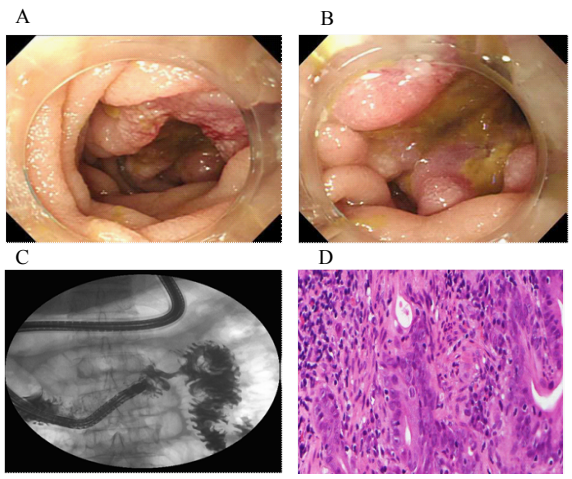

Figure 2: Single-balloon endoscopy revealed a lesion protruding two-thirds of its circumference (with ulcer) into the upper jejunum (A, B). Small intestinal fluoroscopy during the endoscopy revealed an apple core lesion in the upper jejunum (C). A biopsy specimen obtained during single-balloon endoscopy showing a well-differentiated tubular adenocarcinoma (d) (hematoxylin and eosin staining, high power field).

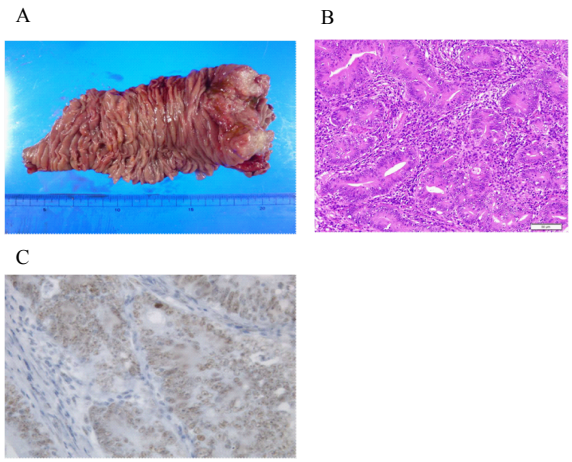

Figure 3: Operative findings revealed a mass in the upper jejunum approximately 5 cm distal from the ligament of Treitz. The resected tumor is 60 x 40 x 30 mm in size (A). Pathological findings revealed atypical cells forming irregular glands thatwere united with each other (B) (hematoxylin and eosin staining, low power field). Cancer cells have invaded the serosa over the muscularis propria. Immunostaining examinations for p53 proteins revealed positive cells with dense stained nuclei in the adenocarcinoma component (C) (high power field).

over the muscularis propria. Histopathological examination of the resected specimen revealed atypical cells forming irregular glands that were united with each other along with invasion of the serosa. There was no invasion of lymph nodes and blood vessels (Figure 3B). The postoperative diagnosis was well-differentiated tubular adenocarcinoma of the jejunum, T2N0M0, stage II. Immunostaining examinations for p53 proteins revealed positive cells with dense stained nuclei in the adenocarcinoma component (Figure 3C). The postoperative course was uneventful, and the patient was discharged in the ambulatory state. Postoperative chemotherapy was not planned.

Discussion

Small intestinal tumors are rare in adults, with an incidence of 0.7–1.7/100,000, and they account for 1.7%–6.5% [1-3] of all gastrointestinal tumors. Among small intestinal tumors, small intestinal carcinoma is a malignant epithelial tumor of the small intestine. Histologically, small intestinal carcinoma is classified as adenocarcinoma, mucinous carcinoma, signet ring carcinoma, squamous cell carcinoma, medullary carcinoma, and undifferentiated carcinoma. Yao et al. [4] reported that small intestinal carcinoma accounted for 32.6% of all small intestinal tumors, malignant lymphoma for 30.4%, leiomyosarcoma for 29.1%, neurogenic tumor for 1.7%, carcinoid for 1.7%, and Kaposi's sarcoma for 0.2%. Before the advent of CE or BE, it was impossible to perform endoscopic examinations of the small intestine; therefore, the diagnosis of small intestinal carcinoma was difficult. Most small intestinal carcinomas have been found at an advanced stage because of the lack of clinical presentations or difficulties in detection of the disease. In recent years, with the advent of CE and BE, the diagnosis of small intestinal carcinoma can be made without difficulty, and an increasing number of small intestinal carcinomas are found at an early stage. With CE and BE, it is possible to inspect the condition of all gastrointestinal tracts, including the small and large intestine, stomach, and esophagus. In 2000, the clinical use of CE was first reported in Nature [5]. In 2001, the use of CE was approved by the U.S. Food and Drug Administration. Currently, CE can be used worldwide. CE allows complete exploration of the small intestine in a safe and noninvasive manner. Furthermore, double-balloon endoscopy was developed in 2001 in Japan and introduced worldwide. Double-balloon endoscopy also allows visualization and exploration of the small intestine and aids in the performing interventional procedures. In 2007, single-balloon endoscopy was released by Olympus Corporation. Consequently, BE includes single-balloon endoscopy and double-balloon endoscopy, and it allows clear observation of a lesion in the small intestine and provides the functions of rinsing with water or introduction of air into the tract. CE, on the other hand, does not provide these functions.

Before the era of CE and BE, small bowel series was the gold standard for diagnosis of small intestinal tumors. The presence of stenosis and/or protrusion of the small intestine are signs of a small intestinal tumor. Contrast-enhanced CT is also effective for diagnosis, and the findings of a hypertrophic intestinal wall or mass enhanced by contrast medium are characteristic of small intestinal tumors. Presently, final diagnosis of small intestinal tumors is made on the basis of endoscopic findings, and findings of hemorrhagic or ulcerated masses are characteristic of this technique. The detection of hemorrhage, protrusion, mucosal irregularity, and/or change in mucosal color by CE is indicative of these tumors. Very large tumors, however, may be overlooked by CE [6]. Indirect signs of regional transit abnormality and retention of the CE capsule for >60 minutes in the same location because of intestinal wall compression by the tumor are reported to be efficient for detection of the tumor [7]. Without the functions of introducing air and rinsing with water, CE has the advantage of facilitating observation of the physiological intestine, although it may fail to detect the tumor inside circular folds of the intestine. BE requires many medical personnel, takes a long time, and is a burden to both the operator and patient. Therefore, CE is considered to be the first choice of modality for the examination of OGIB in many institutions.

Approximately 70% small intestinal tumors are jejunal tumors, while 30% are ileal tumors. The former usually develop within 60 cm from the Treiz ligament, while the latter develop within 40 cm from Bauhin's valve. Even though the small intestine has an approximately 10-fold greater surface area than that of the colon, the incidence of small intestinal tumors is low. Several factors have been suggested to

explain the low occurrence of small intestinal tumors [8,9]. First, small intestinal mucosa has low carcinogenic potential and low production of carcinogens because of low bacterial colony counts. Second, an increase in benzyl peroxidase and immunoglobulin A may prevent the development of tumors. Third, a widespread gut lymphoid tissue may be a factor preventing the growth of such tumors. Fourth, rapid flow through the small intestine limit contact time and irritation of the mucosa.

The standard treatment for small intestinal carcinoma is surgical resection, similar to that for colorectal cancer. There is no consensus on the extent of tumor and lymph node resection. Incurable resected cases should be treated with postoperative chemotherapy. Although there are no confirmed protocols concerning chemotherapy for small intestinal carcinomas, some authors have reported the use of TS-1 or FOLFOX [10,11].

In colon, adenoma is generated by mutations of the APC genes and developed by mutations of the ras genes. Moreover, malignant transformation is associated with mutations of the p53 genes [12,13]. In colon, the overexpression of the p53 protein is supposed to be the index of malignant transformation. Some author [14] reported the overexpression of the p53 proteins was highly found in adenocarcinoma of the small intestine. Therefore, the mutation of p53 is supposed to play an important role in malignant transformation also in small intestine.

Conclusion

We encountered a male patient with a jejunal carcinoma that was successfully detected by CE and BE. Before the era of CE and BE, the diagnosis of small intestinal tumors was difficult. However, with the advent of CE and BE, early-stage small intestinal tumors, which are difficult to detect by small intestinal fluoroscopy or CT, can be detected while searching for the cause of OGIB. Therefore, in cases with occult-blood positivity or OGIB, CE can be helpful for detection of small intestinal disease.

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