

# A case of juvenile polyposis of the stomach with multiple early gastric cancers

RYUSUKE SAITO<sup>1</sup>, TOSHIKATSU FUKUDA<sup>1</sup>, NOBUAKI FUJIKUNI<sup>1</sup>, TOMOYUKI ABE<sup>1</sup>,  
HIRONOBU AMANO<sup>1</sup>, MASAHIRO NAKAHARA<sup>1</sup>, SHUJI YONEHARA<sup>2</sup> and TOSHIO NORIYUKI<sup>1,3</sup>

Departments of <sup>1</sup>Surgery and <sup>2</sup>Pathology, Onomichi General Hospital, Onomichi-shi, Hiroshima 722-8508;

<sup>3</sup>Department of Gastroenterological and Transplant Surgery, Hiroshima University,  
Hiroshima-shi, Hiroshima 734-8551, Japan

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**Abstract.** The present study described the case of a 24-year-old man who was diagnosed with multiple gastric hyperplastic polyps in 2004. Repeated *Helicobacter pylori* tests were negative, and colonoscopy revealed no specific findings. The patient started taking a proton-pump inhibitor and iron supplements as a result of anemia caused from the occasional bleeding from the polyps. The number and size of the polyps had increased over time. Endoscopic mucosal resection was occasionally performed when bleeding occurred from large polyps. Finally, histological examination revealed that the surface of the polyp had been replaced with well-differentiated adenocarcinoma in 2014. Laparoscopy-assisted total gastrectomy with Roux-en-Y esophagojejunostomy was performed in 2014. The final diagnosis was juvenile polyposis of the stomach with multiple early gastric cancers. Juvenile polyposis of the stomach is a rare disease, and its malignant potential has been reported previously. The present case highlighted the importance of not delaying surgical intervention in cases of juvenile polyposis of the stomach, since it is associated with a high occurrence of gastric cancer.

## Introduction

Juvenile polyposis syndrome (JPS) is a rare disease characterized by multiple hamartomatous polyps in the gastrointestinal tract (1). The most frequently affected site is the colorectum (98%), followed by the stomach (14%) and the small intestine (8.8%) (2). JPS is subdivided into three groups: Juvenile

polyposis of infancy, juvenile polyposis coli and generalized juvenile polyposis (3,4). A fourth category, juvenile polyposis of the stomach, has been reported, which is used to describe polyps limited to the stomach at the time of the initial diagnosis (5,6). JPS is generally recognized as consisting of benign hyperplastic polyps; however, it has recently been reported that these hyperplastic polyps have malignant potential. The present study reported a case of juvenile polyposis of the stomach with multiple early gastric cancers treated by laparoscopy-assisted total gastrectomy.

## Case report

A 24-year-old man with an unremarkable medical history was referred to Onomichi General Hospital (Hiroshima, Japan) as a result of melena and anemia in 2004. An upper gastrointestinal endoscopy in 2004 revealed multiple edematous polyps around the fundus of the stomach (Fig. 1). Histological examination revealed a hyperplastic and disorganized foveolar epithelium, and an edematous lamina propria with infiltration of inflammatory cells, and the histological diagnosis was hyperplastic polyps. The patient began taking a proton-pump inhibitor and iron supplements, and he underwent an upper gastrointestinal endoscopy annually. The polyps appeared around the fundus in 2004 and had gradually progressed to the entire stomach in 2014 (Fig. 2). The number and size of the polyps had also increased. Endoscopic mucosal resection was performed frequently due to bleeding from the polyps. It was difficult to control the progressing anemia by non-surgical treatment, and, in 2014, histological examination revealed for the first time that the benign polyps were adenocarcinoma. Surgical treatment was therefore performed. At the time of surgery, the patient was 171 cm tall and weighed 62.5 kg. No skin lesions or loss of hair, which is characteristic of Cronkhite-Canada syndrome, was exhibited. Laboratory data demonstrated mild anemia (hemoglobin, 9.6 g/dl), but neither hypoproteinemia nor elevation of tumor markers, including carcinoembryonic antigen and carbohydrate antigen 19-9 was observed. With respect to the patient's family history, the patient's mother had succumbed to colon cancer in her 50s and his cousin had succumbed to an unknown primary cancer in his 30s.

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*Correspondence to:* Dr Toshio Noriyuki, Department of Surgery, Onomichi General Hospital, 1-10-23 Hirahara, Onomichi-shi, Hiroshima 722-8508, Japan  
E-mail: nori0509\_0217@yahoo.co.jp

*Abbreviation:* JPS, juvenile polyposis syndrome

*Key words:* juvenile polyposis of the stomach, gastric cancer, *Helicobacter pylori*, laparoscopic surgery, total gastrectomy

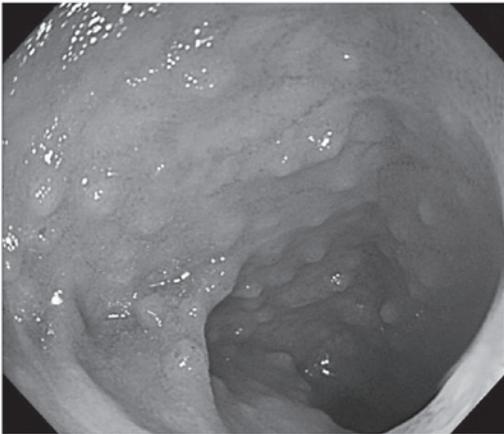


Figure 1. Upper gastrointestinal endoscopy in 2004. An upper gastrointestinal endoscopy from 2004 revealed small polyps only around the fundus.



Figure 2. Upper gastrointestinal endoscopy in 2014. An upper gastrointestinal endoscopy from 2014 revealed that the number and size of the polyps had increased.

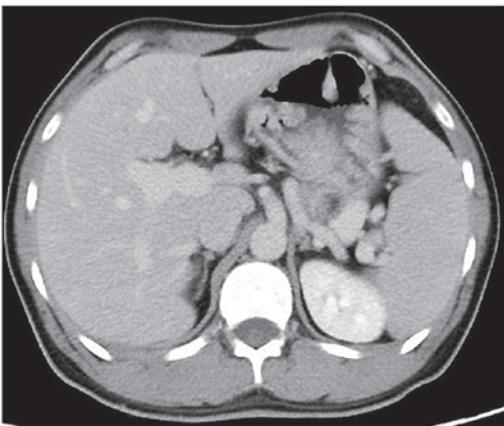


Figure 3. Enhanced computed tomography of the abdomen. Enhanced computed tomography of the stomach wall revealed that the stomach wall was edematous and enhanced, with thickening from multiple polyps.

Colonoscopy revealed no specific findings. Enhanced computed tomography revealed that the stomach wall was edematous with enhanced thickening from multiple



Figure 4. Upper gastrointestinal series. An upper gastrointestinal series demonstrated that multiple polypoid lesions were widespread throughout the entire stomach.

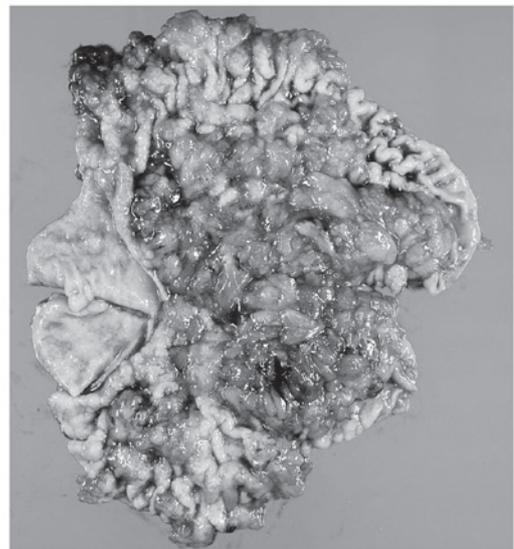


Figure 5. Macroscopic findings of the resected specimen. The resected specimen exhibited numerous diffuse polyps throughout the entire stomach.

polyps (Fig. 3). An upper gastrointestinal series revealed that multiple polypoid lesions were limited to the entire stomach and were not present in the small intestine (Fig. 4). The patient underwent laparoscopy-assisted total gastrectomy with Roux-en-Y esophagojejunostomy. The resected specimen revealed numerous diffuse polyps throughout the entire stomach (Fig. 5). Microscopic findings revealed a hyperplastic and disorganized foveolar epithelium with an atypical nuclear shape. Enlargement of the nucleolus was also observed, and the patient was diagnosed with well-differentiated adenocarcinoma. A total of three lesions of early gastric cancer, and no lymph node metastasis were detected. Immunohistochemical staining revealed that the specimen was positive for p53 and carcinoembryonic antigen

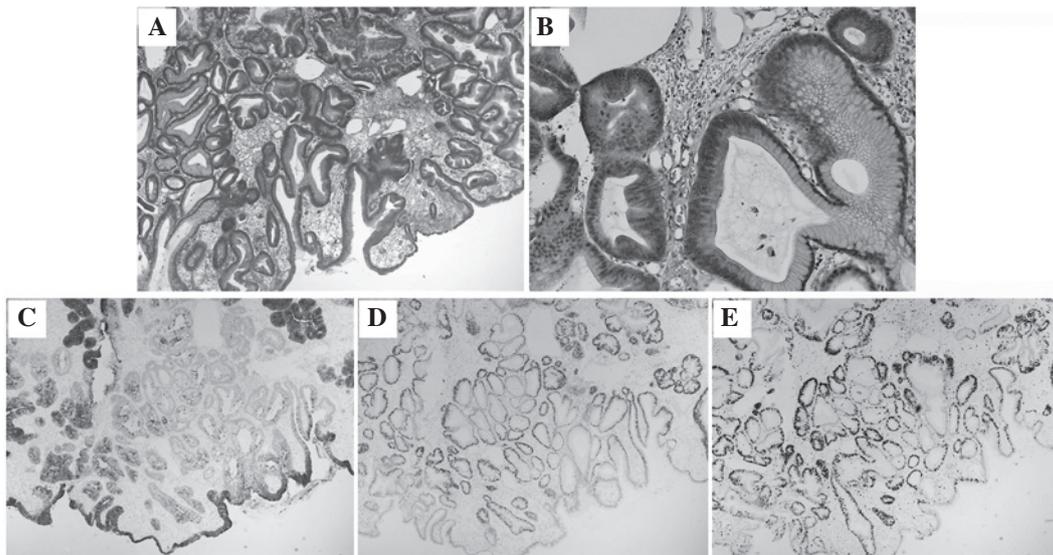


Figure 6. Histological examination of the resected specimen. The histological examination revealed a scattered area of well-differentiated adenocarcinoma, which was limited to the mucosa for juvenile polyps. Hematoxylin and eosin staining at (A) magnification, x50 and (B) x100. Immunohistochemical staining demonstrated that the specimen was positive for (C) carcinoembryonic antigen, (D) p53 and a high index of (E) mindbomb E3 ubiquitin protein ligase 1.

and exhibited a high index of mindbomb E3 ubiquitin protein ligase 1 (Fig. 6). The postoperative course was uneventful, hemoglobin level returned to the normal range, and the patient experienced no recurrence over a 1 year follow-up.

## Discussion

To the best of our knowledge, the present case is a rare case of juvenile polyposis of the stomach, associated with multiple early gastric cancers. In Japan, the incidence of juvenile polyposis of the stomach is higher compared with that observed in previous reports (1,7). The association of gastric cancer with juvenile polyposis of the stomach is well-known in Japan, with a frequency of ~50% (8). The present strategy for symptomatic juvenile polyposis of the stomach is surgical intervention. Notably, recurrence of gastric cancer and polyps in the remnant stomach has been previously reported; therefore, total gastrectomy is recommended as standard treatment in cases of juvenile polyposis of the stomach (2). JPS is an autosomal dominant hereditary syndrome with characteristic multiple hamartomatous polyps throughout the entire intestine, and was first reported by McColl *et al* (9) in 1964. Watanabe *et al* (5) first reported JPS limited to the stomach as juvenile polyposis of the stomach in 1979. Few reports exist in the English literature of polyps predominantly occurring in the stomach. Certain hamartomatous diseases of the stomach occur, for which differential diagnosis is necessary, including Cronkhite-Canada syndrome and Peutz-Jeghers syndrome (10). Skin lesions and family history are helpful for distinguishing JPS from these syndromes. It is known that 20-50% of patients have a family history of JPS, and its mechanism of inheritance is autosomal dominant with variable penetrance. Previously, mutations in *SMAD4* and *BMPRIA*, which are implicated in the transforming growth factor- $\beta$  pathway, have been identified as the disease genes for this syndrome, and the probability of a mutation in each in JPS is 20% (11,12). The incidence of gastrointestinal

cancer in JPS is ~20% (11). The most frequently observed clinical feature is anemia (89%), followed by hypoproteinemia (67%). It is difficult to control this condition with non-surgical treatment. The histological findings of the present study revealed a hyperplastic and disorganized foveolar epithelium with atypia, and the patient was diagnosed with well-differentiated adenocarcinoma. In the present case, three lesions of mucosal adenocarcinoma were observed in the resected specimen. It has been previously reported that colorectal lesions have developed into adenocarcinoma during follow-up (2). Howe *et al* (13) reported that the risk of gastrointestinal cancer in family members of patients with JPS exceeded 50%.

In conclusion, the present study described a rare case of juvenile polyposis of the stomach with early gastric cancers following curative resection. The patient has remained disease-free for 1 year following surgery. Special attention should be paid to the intestine and colorectum in patients with JPS. Additionally, family members of the present patient should also take gastrointestinal fiber and undergo genetic examination as a result of the patient's strong family history.

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