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World Journal of Gastroenterology (*World J Gastroenterol*, *WJG*, print ISSN 1007-9327, online ISSN 2219-2840, DOI: 10.3748) is a peer-reviewed open access journal. *WJG* was established on October 1, 1995. It is published weekly on the 7th, 14th, 21st, and 28th each month. The *WJG* Editorial Board consists of 642 experts in gastroenterology and hepatology from 59 countries.

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World Journal of Gastroenterology (*WJG*) is now indexed in Current Contents[®]/Clinical Medicine, Science Citation Index Expanded (also known as SciSearch[®]), Journal Citation Reports[®], Index Medicus, MEDLINE, PubMed, PubMed Central and Directory of Open Access Journals. The 2018 edition of Journal Citation Reports[®] cites the 2016 impact factor for *WJG* as 3.365 (5-year impact factor: 3.176), ranking *WJG* as 29th among 79 journals in gastroenterology and hepatology (quartile in category Q2).

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NAME OF JOURNAL
World Journal of Gastroenterology

ISSN
ISSN 1007-9327 (print)
ISSN 2219-2840 (online)

LAUNCH DATE
October 1, 1995

FREQUENCY
Weekly

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PUBLICATION DATE
January 28, 2018

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Neuroendocrine carcinoma of the gastric stump: A case report and literature review

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Author contributions: Tian YT and Xue LY designed the report; Xie YB, Zhong YX and Xu Q collected the patient's clinical data; Ma FH and Chen YT analyzed the data and wrote the paper.

Supported by Beijing Municipal Science and Technology Commission, No. 30224801; and National Natural Science Foundation of China, No. 81772647.

Informed consent statement: Consent was obtained from relatives of the patient for publication of this report and any accompanying images.

Conflict-of-interest statement: The authors declare that they have no conflicts of interest.

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Manuscript source: Unsolicited manuscript

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Received: November 10, 2017

Peer-review started: November 11, 2017

First decision: November 30, 2017

Revised: December 11, 2017

Accepted: December 20, 2017

Article in press: December 20, 2017

Published online: January 28, 2018

Abstract

We herein report a case of neuroendocrine carcinoma of the gastric stump found 47 years after Billroth II gastric resection for a benign gastric ulcer. A 74-year-old man was referred to another hospital with melena. Endoscopic examination revealed a localized ulcerative lesion at the gastrojejunal anastomosis. The diagnosis by endoscopic biopsy was neuroendocrine carcinoma. A total gastrectomy of the remnant stomach with D2 lymphadenectomy was performed at our hospital. The lesion invaded the subserosa, and metastasis was found in two of nine the lymph nodes retrieved. The lesion was positive for synaptophysin and chromogranin A, and the Ki-67 labeling index was 60%. The diagnosis of neuroendocrine carcinoma of the gastric stump was confirmed using World Health Organization 2010 criteria. Subsequently, the patient underwent one course of adjuvant chemotherapy with the etoposide plus cisplatin (EP) regimen; however, treatment was discontinued due to grade 3 myelosuppression. The patient showed lymph node metastasis in the region around the gastrojejunal anastomosis in the abdominal cavity 7 mo post-surgery. He then underwent radiotherapy and platinum-based combination chemotherapy; however, the disease progressed and liver recurrence was observed on follow-up computed

tomography at 16 mo post-surgery. The patient then received chemotherapy with regimens used for the treatment of small cell lung cancer in first- and second-line settings. The patient died of disease progression 31 months after surgery.

Key words: Gastric stump; Gastric stump cancer; Neuroendocrine carcinoma

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Core tip: The most common form of gastric stump cancer is adenocarcinoma. Various types of malignancies have been reported previously, but the development of neuroendocrine carcinoma from the gastric stump is rare. This case might contribute to improving our understanding of the carcinogenesis, biology, and behavior of gastric neuroendocrine carcinoma and gastric stump cancer.

Ma FH, Xue LY, Chen YT, Xie YB, Zhong YX, Xu Q, Tian YT. Neuroendocrine carcinoma of the gastric stump: A case report and literature review. *World J Gastroenterol* 2018; 24(4): 543-548 Available from: URL: <http://www.wjgnet.com/1007-9327/full/v24/i4/543.htm> DOI: <http://dx.doi.org/10.3748/wjg.v24.i4.543>

INTRODUCTION

Gastric stump cancer (GSC) is a well-known long-term complication after distal gastrectomy, and has been reported to account for 1%-8% of all gastric cancers. The most common form of GSC is adenocarcinoma^[1], although various types of gastric stump malignancies have been reported^[2-6]. Development of neuroendocrine carcinoma (NEC) from the gastric stump is extremely rare. To the best of our knowledge, only a case of NEC in the gastric stump has been reported in the English literature, at the University of Parma, Italy^[7]. Herein we report a case of NEC of the gastric stump diagnosed 47 years after distal gastrectomy for a benign gastric ulcer.

CASE REPORT

A 74-year-old man consulted a doctor for melena at another hospital. He had undergone a distal gastrectomy with Billroth II reconstruction for a gastric ulcer 47 years ago. He had been having moderate hypertension for 10 years, for which he was taking thiazide daily. A hemorrhage from the upper gastrointestinal tract was suspected. Upper endoscopic examination revealed a localized ulcerative lesion located on the gastrojejunal anastomosis. Contrast-enhanced computed tomography (CT) scans revealed thickening of the stomach wall above the gastrojejunostomy site. There was no evidence of extension of the lesion into the serosa or surrounding soft tissues (Figure 1). An endoscopic

biopsy of the tumor was performed. Pathologic examination of the biopsies revealed nests of tumor cells with poor differentiation. The cells showed diffuse positivity for synaptophysin and chromogranin A. Based on biopsy results, the patient was diagnosed with NEC.

A total gastrectomy of the remnant stomach with D2 lymphadenectomy and Billroth II reconstruction was performed at our hospital. A low-power histological view revealed that tumor cells had invaded entire layers of the stomach wall and showed infiltrative growth from the muscularis propria to the serosa with angiolymphatic invasion and carcinoma cell embolus (Figure 2). The TNM classification was T3N0M0 (stage IIIA). High-power views revealed monotonous large tumor cells with abundant cytoplasm and large irregular nuclei containing prominent nucleoli; mitotic figures were also observed (60 per 10 high-power fields). Immunohistochemical staining revealed that the tumor cells were positive for chromogranin A, CD56, and synaptophysin. The Ki-67 labeling index was 60%. Thus, the diagnosis of gastric stump large-cell NEC was confirmed.

The patient's postoperative course was favorable, and he was subsequently discharged from the hospital. The patient also commenced a course of adjuvant chemotherapy (EP regimen: 20 mg cisplatin on day 1 and 100 mg etoposide on days 1-4, once a month for one course). However, he experienced grade 3 myelosuppression as a side-effect after this first course of chemotherapy, resulting in treatment suspension due to patient refusal to undergo further treatment. Seven months after the operation, CT scanning revealed lymph node metastasis in the region around the gastrojejunal anastomosis in the abdominal cavity (Figure 4); as a result, the patient received six cycles of chemotherapy (EP regimen: 20 mg cisplatin on days 1-4, and 100 mg etoposide on days 1-3), to which a partial response was achieved. Following this, at 13 mo post-surgery, the patient underwent locoregional radiotherapy, with a total of 60 Gy in 15 fractions. Follow-up CT scanning revealed a recurrence in the liver at 16 mo post-surgery. Two cycles of chemotherapy with the EP regimen were given; however, the patient again experienced grade 3 myelosuppression and disease progression was observed. He then received five cycles of chemotherapy with 240 mg irinotecan on day 1 and 40 mg S-1 on days 1-10, four cycles of chemotherapy with the CAV regimen (0.5 g cyclophosphamide on day 1, 50 mg doxorubicin on days 1-2 and day 21, and 2 mg vincristine on day 1), and two cycles of chemotherapy (200 mg paclitaxel on day 1 and day 14). Despite this treatment, the disease progressed and his performance status deteriorated. He died 31 mo after the operation.

DISCUSSION

GSC was first reported as a disease entity by Balfour in 1922^[8]. It was initially defined as a cancer that arose

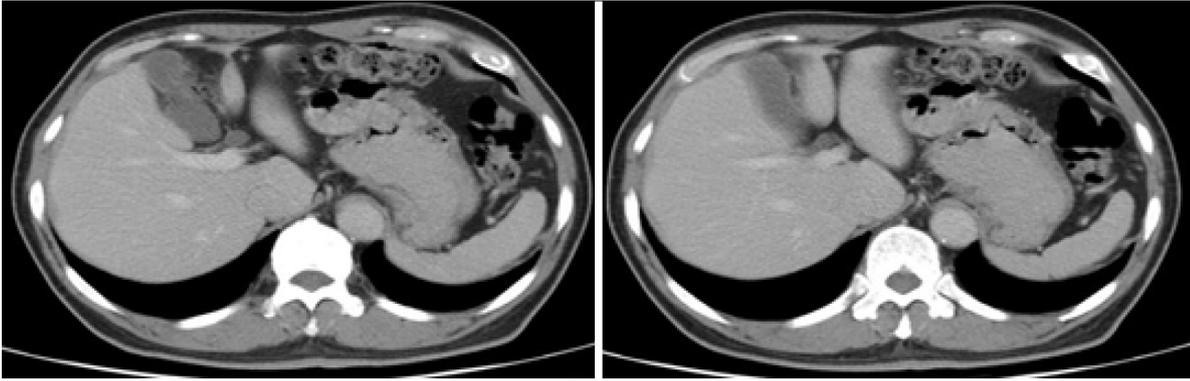


Figure 1 Pre-treatment abdominal contrast-enhanced computed tomography images. These reveal thickening of the stomach wall above the gastrojejunostomy site without enlarged perigastric lymph nodes. There is no evidence of lesion extension into the serosa or surrounding soft tissues.

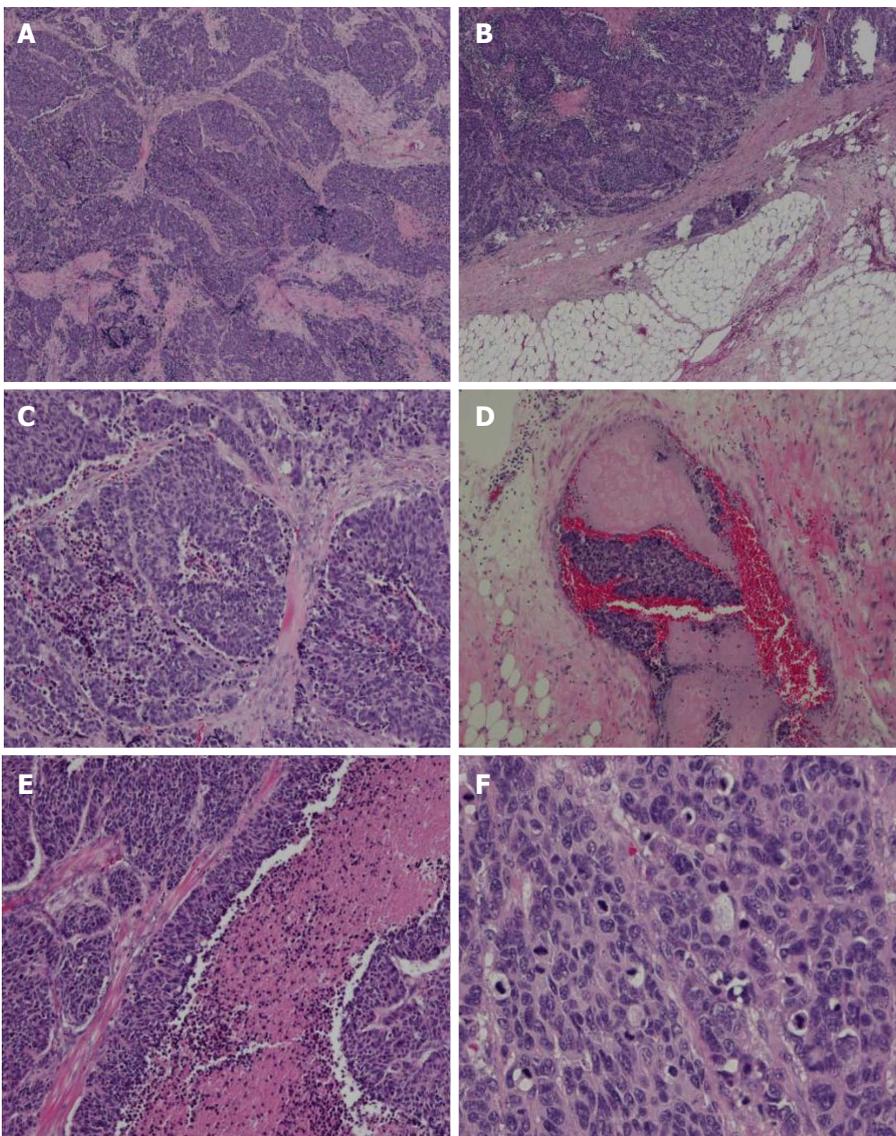


Figure 2 Histological findings. A: A low-power histological view. Tumor cells show infiltrative growth from the muscularis propria to the subserosa (HE, $\times 40$). B: Large-cell carcinoma showing invasion into the subserosa. C: High-power view shows monotonous large tumor cells with abundant cytoplasm and large irregular nuclei with prominent nucleoli (HE, $\times 100$). D and E: Angiolymphatic invasion and carcinoma cell embolus. F: Mitotic figures were also observed (60 per 10 high-power fields). HE: Hematoxylin and eosin.

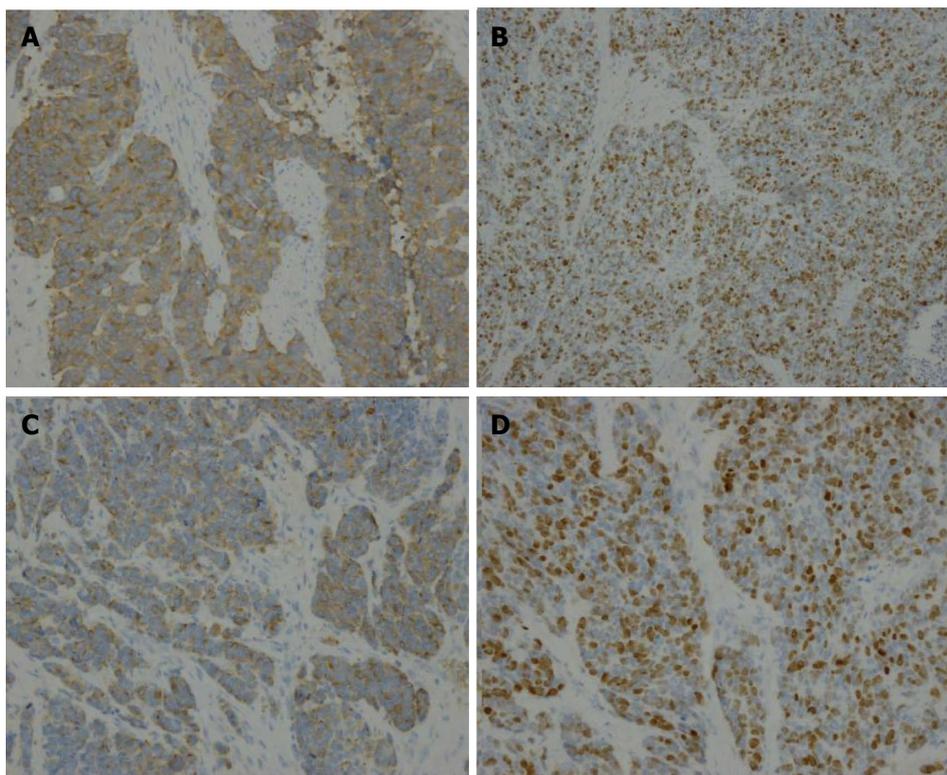


Figure 3 Immunohistochemical staining. Positive immunohistochemical staining for (A) synaptophysin ($\times 200$), (B) CD56 ($\times 200$), and (C) chromogranin A ($\times 200$). D: The Ki-67 index is about 60% ($\times 200$).



Figure 4 Computed tomography scan 7 mo after the operation. This image reveals lymph node metastasis in the region around the gastrojejunal anastomosis in the abdominal cavity.

in the remnant stomach 5 years after gastrectomy for benign diseases such as peptic ulcers^[9]. Currently, the concept of GSC has been expanded to include recurrence after gastric cancer resection, which has been reported to account for 1%-7% of all gastric cancers^[10]. Gastric NEC (GNEC) is a rare neoplasm known for its aggressive behavior and poor prognosis, accounting for 0.1%-0.6% of all gastric carcinomas^[11]. Primary gastric stump NEC is exceptionally rare. A search of the literature revealed documentation of only one such case, described by D'Adda *et al*^[7] who identified a case of metastatic NEC that developed in the gastric stump 25 years after Billroth II gastric

resection for a duodenal ulcer in 1991.

The carcinogenesis of GSC is strongly associated with chronic duodenogastric reflux of bile and pancreatic juice, and hypochlorhydria secondary to denervation through vagotomy. It has been generally reported that chronic degenerative changes in the gastric mucosa lead to the development of adenocarcinoma with varying degrees of differentiation^[12]. The specific carcinogenetic pathways that lead to GNEC are largely unknown. Whether they are related to the classical mechanisms described for GSC development remains to be better understood.

The World Health Organization 2010 classification defined NEC as a subgroup of neuroendocrine neoplasms (NENs). NENs are divided into neuroendocrine tumors (NET) of grade 1 and grade 2 and NEC grade 3 according to the Ki-67 labeling index^[13]. The Japanese classification of gastric carcinoma defined NEC as a special type in its histological classification of gastric tumors, and classified it to be either of the small-cell or the large-cell type. In 1993, Rindi *et al*^[14] proposed a classification system for gastric NETs (GNETs) wherein tumors were divided into three types by their underlying pathophysiology, etiology, and presentation. According to this classification system, type 1 is associated with chronic atrophic gastritis and hypergastrinemia; type 2 is associated with multiple endocrine neoplasia type 1, Zollinger-Ellison syndrome, and hypergastrinemia; and type 3 is sporadic, gastrin-independent, and is

believed to be the most biologically aggressive GNET. In the present case, based on histological examination and immunohistochemical staining for neuroendocrine markers, the diagnosis was large-cell NEC and the tumor could be classified as a type 3 GNET.

For patients with GNEC, radical gastrectomy plus regional lymph node dissection should be performed for localized disease; adjuvant chemotherapy should also be provided after surgery^[15,16]. Given the rarity of these tumors, there is no standardized chemotherapy for GNEC, and therapy is typically done according to the treatment guidelines for small cell lung cancer. A combination of cisplatin and etoposide (EP regimen) is usually proposed as a first-line therapy for extra-pulmonary high-grade NEC^[17]. We chose to treat this patient with chemotherapy regimens used for the treatment of SCLC both in first- and second-line settings. Although the addition of radiotherapy has improved the survival of patients with resectable SCLC, its role in the treatment of GNECs is unclear given the extremely limited information on its usage in this type of cancer.

In conclusion, GNEC is rare and this study presents the exceptionally unusual occurrence of NEC in the gastric stump following Billroth II gastrectomy. This case will contribute to improvements in our understanding of the carcinogenesis, biology, and behavior of GNEC and GSC. This case may also serve as a reminder to gastroenterologists, surgeons, and pathologists who encounter GSC cases in their clinical practice to consider a diagnosis of NEC and undertake the requisite tests for histological and neuroendocrine markers such as chromogranin A and synaptophysin.

ARTICLE HIGHLIGHTS

Case characteristics

The most common form of gastric stump cancer (GSC) is adenocarcinoma. Various types of gastric stump malignancies have been reported previously, but the development of neuroendocrine carcinoma (NEC) from the gastric stump is rare.

Clinical diagnosis

Gastric ulcer.

Differential diagnosis

Gastric cancer and lymphoma.

Laboratory diagnosis

NEC of the gastric stump.

Imaging diagnosis

Neoplasm of the gastric stump.

Pathological diagnosis

NEC of the gastric stump.

Treatment

Surgery combined with chemotherapy and radiotherapy.

Related reports

A case of neuroendocrine carcinoma in the gastric stump has only been reported once in the English literature from the University of Parma, Italy.

Term explanation

Neuroendocrine carcinoma of the gastric stump.

Experiences and lessons

This case will contribute to improvements in our understanding of the carcinogenesis, biology, and behavior of gastric NEC and GSC. This case may also serve as a reminder to gastroenterologists, surgeons, and pathologists who encounter GSC cases in their clinical practice to consider a diagnosis of NEC and undertake the requisite tests for histological and neuroendocrine markers such as chromogranin A and synaptophysin.

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P- Reviewer: Fernandez JM, McHenry L, Schmidt J
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ISSN 1007-9327



9 771007 932045