Gastric outlet syndrome due to primary gastric signet-ring cell carcinoma in a 22-year-old woman: a case report

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ABSTRACT

Background: Gastric cancer is the fifth most commonly diagnosed cancer and the third most prevalent cause of cancer-related mortality globally. Although there has been a decline in the overall occurrence of gastric cancer over recent years, the incidence of signet-ring cell carcinoma (SRCC) has shown a consistent rise, representing up to 30% of gastric adenocarcinoma cases.

Case Presentation: We present an unusual case of a 22-year-old woman with gastric outlet syndrome secondary to a primary gastric SRCC. A gastro-duodenal endoscopy showed a markedly edematous substenotic pyloro-bulbar region without any ulcers. Biopsy demonstrated gastric mucosa with tumor cells originating from an adenocarcinoma of the diffuse type (SRCC). An abdominal Computed Tomography (CT) scan detected an intestinal malrotation, making an endoscopic gastro-enterostomy not feasible. Despite fluorodeoxyglucose (FDG)-positron emission tomography (PET-CT) showed no distant metastasis, during staging laparoscopy metastatic implants were detected on the peritoneum, diaphragm, and small bowel mesentery. There was no amplification of the HER2 gene and no PD-L1 expression in the tumor cells, making this patient not eligible for immunotherapy. A jejunostomy was placed for enteral nutrition and chemotherapy (FOLFOX) was initiated.

Conclusion: Although diffuse-type gastric carcinoma in young adults (<30 years) is extremely rare, clinicians should be aware of its growing incidence and the importance of early diagnosis. This case advocates for considering gastric carcinoma in the differential diagnosis of gastric outlet syndrome, even in a patient population where this rarely occurs, as early stage diagnosis is crucial to afford these patients improved opportunities for curative treatment.

Keywords: Case report, gastric adenocarcinoma, signet-ring cell carcinoma, diffuse gastric cancer, gastric outlet syndrome.

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Background

Gastric cancer is the fifth most common cancer worldwide and is associated with a high mortality (7,7%) [1]. Despite the overall decline in the incidence of gastric cancer globally, the incidence of signet-ring cell carcinoma (SRCC) is rising and represents up to 30% of cases of gastric adenocarcinoma [2,3]. SRCC is a diffuse type of gastric cancer (DGC) and was previously termed "mucocellular adenocarcinoma", which refers to a particular type of adenocarcinoma characterized by cells containing abundant mucin in the cytoplasm, causing displacement of the nucleus towards the cell periphery [4].

The highest incidence rates of gastric cancer were reported in Eastern Asia, South America, and Eastern Europe and the majority of cases occur in resource-limited countries [5]. In contrast to the intestinal type of gastric cancer (IGC), patients with DGC tend to be younger and female. Further, these diffuse-type lesions are more frequently located in the middle or lower third of the stomach [6]. Despite the clear relationship between dietary conditions and *Helicobacter pylori* as a risk factor for IGC, this role remains unclear in DGC. However, an association between the Epstein Barr virus and tobacco is demonstrated [7]. In addition, DGC is associated with familial syndromes and several genetic mutations have been reported [8].

Case Presentation

A 22-year-old Caucasian woman without prior medical history presented to the gastroenterology consultation because of vague epigastric pain for 1 year and reduced intake for a few weeks, associated with weight loss (5 kg), vomiting of undigested food, and bloating in the evening. She was in good general health with no history of H. pylori or Epstein–Barr virus (EBV). She is a non-smoker but takes birth control pills. Her BMI is 20.5, and she follows a varied diet. There is no family history of cancer on either her father's or mother's side.

A first gastro-duodenal endoscopy had been discontinued due to pronounced food stasis (Figure 1). Proton pump

inhibitor and antiemetics were started and control endoscopy was planned after 2 weeks. Five days later, she presented to the emergency department because of persistent vomiting.

On clinical examination, a mild tenderness and epigastric mass were palpated. Serum blood tests were normal despite a slightly elevated CRP level (10 mg/dl, Ref. ≤5 mg/l). Additional contrast-enhanced CT revealed a clearly demarcated, contrast-capturing, hypertrophic, polypoid mucosal wall thickening (up to 12 mm) located at the distal antrum and pylorus with a length of 5.5 cm (Figure 2). No suspicious lymphadenopathies or lesions suspected of distant metastasis were detected. Intestinal malrotation was detected too, making endoscopic gastro-enterostomy not feasible.

A new endoscopic examination showed a markedly edematous substenotic pyloro-bulbar region causing a gastric outlet obstruction. No clear ulcer was visualized (Figure 3). Histopathologic examination revealed a gastric SRCC (Figure 4). Despite no distant metastasis were found on the FDG PET-CT scan (Figure 5), during staging laparoscopy small metastatic implants were found on the peritoneum, diaphragm, and small bowel mesentery.

Tumour markers CA 19.9 (<9 kU/l; Ref ≤34 kU/l) and CEA (< 1.8 µg/l; Ref ≤3.8 µg/l) were both negative. A HER2-SISH-test showed no amplification of the HER2 gene. Additionally, there was no PD-L1 expression in the tumor cells, rendering this patient ineligible for immunotherapy treatment. No prior family history of gastric cancer was reported.

A jejunostomy was placed for enteral nutrition and chemotherapy was initiated in the form of 5-Fluoro-Uracil + Oxaliplatin + Folinic Acid (FOLFOX). Considering persistent gastric outlet obstruction with the need for a nasogastric tube, a self-expanding metal stent was placed into the gastro-duodenal stricture [uncovered SEMS (60 × 22 mm)] (Figure 6). She is currently tolerating chemotherapy well, in the days following chemotherapy, there is some discomfort and fatigue. The treatment was switched

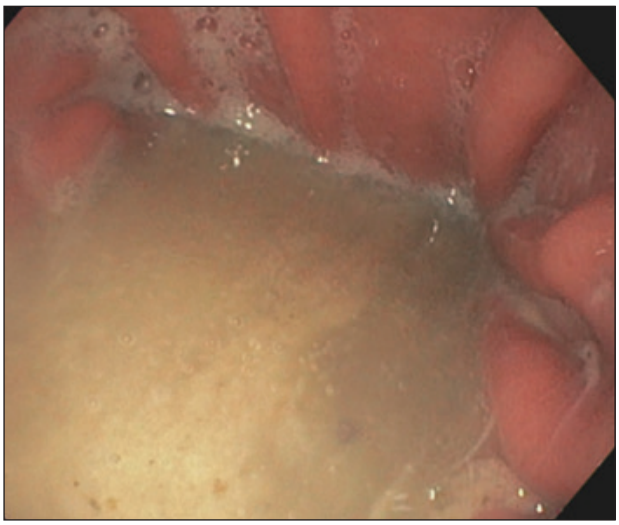

Figure 1. *Initial gastroscopy with undigested foodstasis in the distal antrum.*

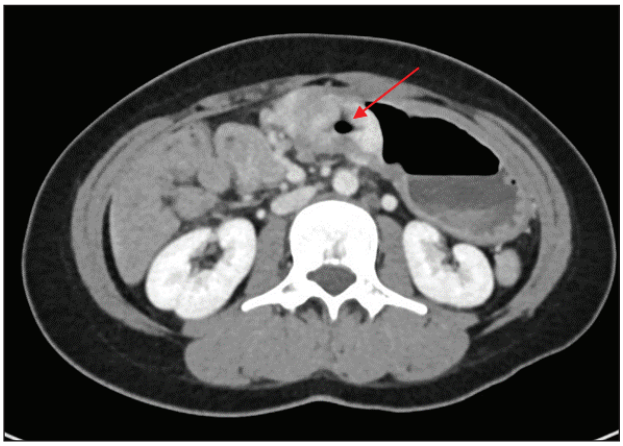

Figure 2. *CT graphic polypoid mucosal wall thickening at the distal antrum and pylorus.*

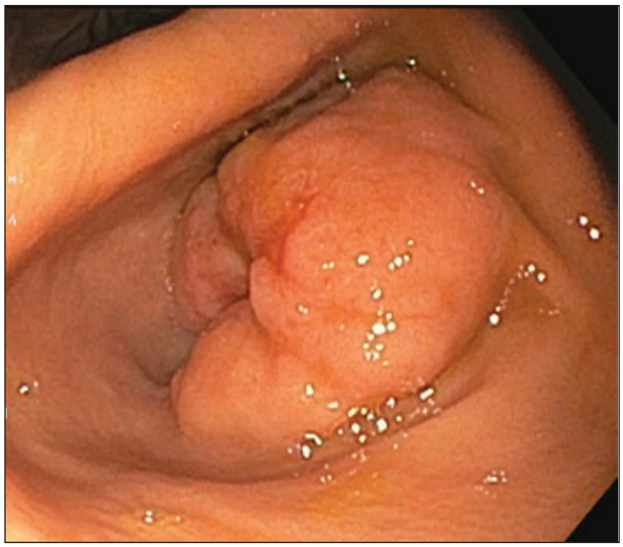

Figure 3. *Gastro-duodenal endoscopy: edematous substenotic lesion in the pyloro-bulbar region.*

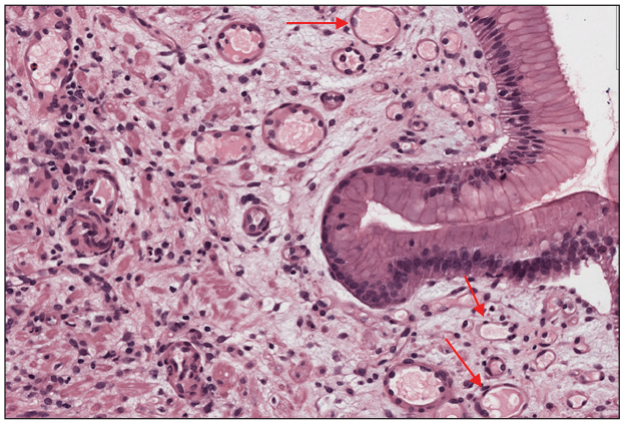

Figure 4. *Histopathologic examination: gastric SRCC (HE; 200x).*

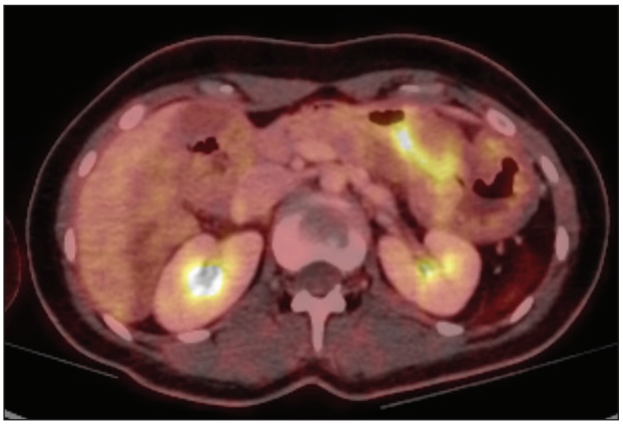

Figure 5. *FDG PET CT-scan: malignancy at the level of the stomach.*

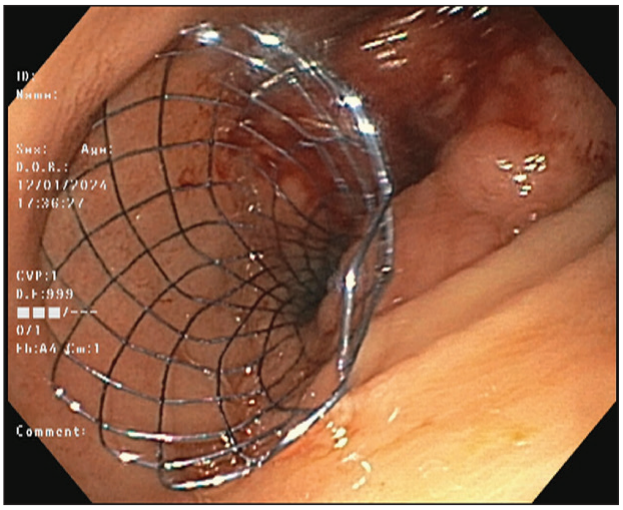

Figure 6. *Gastro-duodenal stenting.*

to FLOT therapy (5-Fluoro-Uracil, Levofolic, Oxaliplatin, and Taxotere). A restaging was performed after 7 cycli of chemotherapy (1× Folfox and 6× FLOT), showing a CT scan with a stable appearance of the primary tumor, no parenchymal metastases, but possible peritoneal thickening consistent with known peritoneal metastasis. The proposed treatment involves administering one additional cycle of FLOT followed by surgery including partial gastrectomy with debulking and HIPEC.

Discussion

Gastric cancer is an aggressive tumor, representing 6.8% of all newly diagnosed cancers [2]. About 95% of gastric tumors are identified as gastric adenocarcinomas (GAC), which can be further classified into IGC, DGC, and mixed histology based on the 1965 Lauren classification [9]. DGC represents 16.8% of all gastric cancer cases. DGC primarily occurs in patients within the age range of 50–69 years (43.7%) and only in less than 1.7% of individuals under 30 years old, making this case exceptionally rare [10].

The overall incidence of GAC has shown a decrease since 1973, potentially linked to a reduction in chronic *H. pylori* infection, diminished tobacco usage, and dietary modifications. Contradictory, over the same period, the prevalence of DGC has been on the rise in both Asian and Western populations. Investigating the factors driving this trend, as well as discerning variances among ethnic and racial subgroups, necessitates further research [8].

In comparison to IGC, DGC is correlated with a more favorable prognosis in early-stage gastric cancer, whereas patients with advanced DGC demonstrate a worse prognosis [6]. DGC is frequently diagnosed at a locally advanced or metastatic stage, characterized by poor tumor-grade differentiation [10,11]. This is attributed to its rapidly infiltrating character into neighboring anatomical structures, such as the peritoneum, omentum, and mesocolon, often leading to peritoneal carcinomatosis which may be missed with standard imaging techniques [8].

The poor prognosis linked to DGC arises both from its aggressive characteristics and its challenging diagnosis in the early stage. The most common symptoms at the time of diagnosis are weight loss and persistent abdominal pain. In more locally advanced cases dysphagia, early satiety, or gastric outlet obstruction may occur, depending on the location. Due to the infrequency of gastric carcinoma in Western Europe and the non-specific nature of initial symptoms, the diagnosis is often delayed, certainly in younger patients [8]. Current literature has already detected risk factors that can contribute to this disease, such as the consumption of pork, smoking, green vegetables, and fruit [12]. Further investigation is necessary to explore additional risk factors (e.g., use of contraceptives) that could potentially influence the development of DGC, allowing for targeted diagnostic and early detection of this pathology.

Conclusion

Despite DGC in young adults is extremely rare, clinicians should be aware of its growing incidence and the importance of early diagnosis. This case report advocates for the inclusion of gastric malignancies in the differential diagnosis of early gastric outlet symptoms and early diagnostic workup in young patients. Further research is necessary to determine risk factors for the development of DGC in young adults.

What is new

DGC is an exceedingly rare occurrence in young adults, with only a handful of cases reported in the literature. The most common symptoms at the time of diagnosis are weight loss and persistent abdominal pain. DGC are frequently diagnosed at a locally advanced or metastatic stage, correlated with a bad prognosis.

List of Abbreviations

CT	Computed Tomography
FDG PET-CT	fluorodeoxyglucose -positron emission tomography
SRCC	signet-ring cell carcinoma
DGC	diffuse type of gastric cancer

IGC intestinal type of gastric cancer
GAC gastric adenocarcinomas

Conflict of interest
The authors declare that they have no conflict of interest regarding the publication of this case report.

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Consent for publication
Written informed consent was obtained from the patient for publication of this case report.

Ethical approval
Ethical approval is not required at our institution to publish an anonymous case report.

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Summary of the case (Sample)

1	**Patient (sex, age)**	22 years, female
2	**Final diagnosis**	Peritoneal metastasized gastric SRCC
3	**Symptoms**	Gastric outlet syndrome
4	**Medications**	Chemotherapy
5	**Clinical procedure**	Pharmacological treatment, secondary indication for surgery
6	**Specialty**	Oncology