Abstract
A 26-year-old Japanese woman who was 23 weeks pregnant presented with nausea, vomiting, and abdominal pain. Gastroduodenal endoscopic examination revealed an oval-shaped submucosal tumor obstructing the gastric outlet at the prepyloric area in the stomach. Magnetic resonance imaging showed a 5-cm cystic tumor and we suspected a degenerated gastrointestinal stromal tumor. No other radiological tests were done because of the associated risks to the fetus. Distal gastrectomy was performed and a histological diagnosis of heterotopic pancreas was confirmed. The patient had an uneventful postoperative course and was discharged 19 days after her operation. She delivered a healthy, full-term male infant 3 months later. This case of an ectopic pancreas obstructing the gastric outlet in a pregnant woman is reported and discussed due to its rarity.

Key words Aberrant pancreas · Pyloric stenosis · Pregnancy

Introduction
Ectopic pancreas is a congenital mislocation of the pancreatic gland. An asymptomatic heterotopic pancreas in the stomach, duodenum, or jejunum is not uncommon, but it seldom causes obstruction in an adult. We report a case of an ectopic pancreas causing pyloric obstruction in a pregnant woman for whom a gastrectomy was safely performed 3 months before the baby was born.

Case Report
A 26-year-old Japanese woman presented to our hospital with nausea and vomiting. She was 23 weeks pregnant and was admitted with a tentative diagnosis of hyperemesis gravidarum. Complete blood counts showed a hemoglobin level of 11.4 g/dl and a white blood count of 9,700. Serum chemistry showed lactate dehydrogenase 144 IU/l (normal 106–211), alkaline phosphatase 220 IU/l (normal 104–338), and C-reactive protein 0.79 mg/dl (normal <0.27). On the second day after admission gastrofiberscopic examination showed a submucosal tumor in the lower part of the stomach, prolapsing through the pyloric ring and obstructing the gastric outlet (Fig. 1). Magnetic resonance imaging (MRI) showed a 4.7 × 2.4-cm tumor in the posterior wall of the gastric body with low and high signal intensity at T1- and T2-weighted images, respectively, which suggested a degenerated gastrointestinal stromal tumor (GIST) (Fig. 2). Extracorporeal ultrasonography was not done because the tumor was located mainly in the stomach and radiological tests were not performed to avoid irradiating the fetus. A central venous line was inserted and total parenteral nutrition was commenced preoperatively. Distal gastrectomy was performed through a 7-cm upper midline incision without lymphadenectomy. The proximal remnant stomach was Anastomosed with the duodenum in a end-to-end fashion. Histological examination of the resected specimen revealed submucosal macro- to microcysts covered with columnar and mucin-producing epithelium (ectopic ducts) associated with acinar glands, islets, and a smooth muscle layer in the surrounding area. Thus, a diagnosis of heterotopic pancreas in the stomach was confirmed (Fig. 3). The patient was discharged 19 days after her operation.
postoperatively and delivered a 2,660-g, full-term male infant 3 months later.

Discussion

Ectopic pancreas in the wall of the stomach is a relatively common surgical finding with a reported incidence of 1%–2%. The symptoms it causes include epigastric pain (77%), abdominal fullness (30%), and tarry stools (24%) due to ulceration, intussusception, and obstruction. Histologically, it consists of well-differentiated duct-like structures, some of which may be dilated. Acinar tissue is almost invariably present to some extent, although islets are found in only 30% of cases.

This disorder is difficult to diagnose preoperatively, despite modern diagnostic procedures such as abdominal ultrasonography, gastroduodenoscopy, and computed tomography (CT). According to one report, only 1 of 17 patients (6%) was considered to have a heterotopic pancreas preoperatively. In our patient, an accurate diagnosis was not able to be made from the MRI findings because of the contrast medium restrictions and the motion artifact of the fetus. Degenerated GIST is similar to a submucosal tumor with a central cyst, although it usually grows extraluminally rather than intraluminally in the upper stomach. Contrast-enhanced CT scans may help to make a prompt diagnosis.

Taking a full-thickness biopsy of the lesion at surgery is mandatory for establishing the diagnosis of heterotopic pancreas from a frozen section; however, this carries the risk of scattering cells if there is malignant disease. This disorder can be treated by various operative procedures, including bypass gastroenterostomy or antrectomy with gastroduodenal anastomosis. Lymphadenectomy is not considered necessary as lymphatic spread rarely occurs from a heterotopic pancreas or GIST. Less invasive surgery was successfully performed in our patient through a small skin incision. We decided that antrectomy without lymph node dissection was most appropriate to avoid interruption of the pregnancy.

Although heterotopic pancreas often exists from childhood, it seldom causes symptoms. Conditions that trigger this previously asymptomatic disorder to become symptomatic include bacterial infection and pancreatitis, but this is the first report of an ectopic pancreas becoming symptomatic due to pregnancy. We think that symptoms developed in our patients as the enlarging uterus narrowed both the gastroduodenal canal and the peritoneal space, although the ectopic pancreas itself existed beforehand. To our knowledge, there is no report about the relationship of enlargement of a heterotopic pancreas with the hormonal changes in gestation.