



## A rare cause of vomiting: annular pancreas

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### Abstract

Annular pancreas is a rare congenital anomaly that consists of a ring of pancreatic tissue partially or completely encircling the second part of the duodenum. It can affect anyone from neonates to adults, and is difficult to diagnose because it can present in a wide range of clinical conditions. Although cases have also been reported in adults, symptomatic cases are often referred in infancy or early childhood.

A 17-year-old female patient who was diagnosed as having annular pancreas is reported. The patient had had non-bilious vomiting accompanied by abdominal pain, especially 5-10 minutes after meals, for seven years. Annular pancreas, which may be seen at any age, should be considered in the differential diagnosis of patients with non-bilious vomiting, particularly after meals, over a long period.

**Keywords:** Annular pancreas, child, vomiting

### Introduction

Annular pancreas is a rare congenital anomaly characterized by a complete or partial ring of pancreatic tissue encircling the second part of the duodenum (1). This condition was described by Tiedemann for the first time in 1818 and named as annular pancreas by Ecker in 1862 (2).

Although cases have also been reported in adults, symptomatic cases are often referred in infancy or early childhood. It may affect anyone from the neonatal period to adulthood. Its diagnosis is difficult because it may present with many clinical pictures including pancreatic tumors, pancreatitis, obstructive jaundice, obstruction in the duodenum and peptic ulcer disease (3). Therefore, we wished to present a patient who had had vomiting after meals for seven years and was diagnosed as having annular pancreas.

### Case

A seventeen-year-old female patient presented with vomiting and occasional abdominal pain, which had lasted for seven years. She had non-bilious vomiting, especially 5-10 minutes after meals. Abdominal pain occurred occasionally before vomiting. She lost 8 kg in the last two months. In the last one month, her malaise increased and she had difficulty even in walking. She had no other accompanying symptoms and used no medication. She had been hospitalized previously and treated for acute gastroenteritis. Subsequently, she was investigated in the Pediatric Gastroenterology Outpatient Clinic because of the inability to gain weight, developmental retardation, and vomiting; gastroscopy was performed, but no pathology was found. When the patient presented to our clinic, a physical examination revealed that her height and weight were below the third percentile, her general status was poor,

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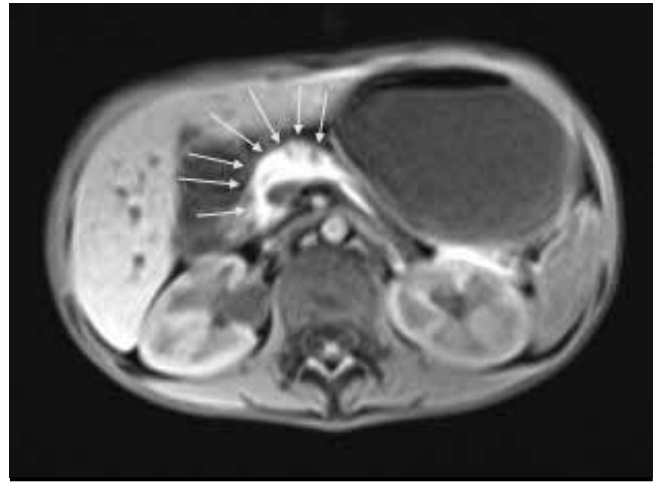


**Picture 1.** Extensive fungal lesions starting from the 35<sup>th</sup> cm are observed in the esophagus on gastroscopy



**Picture 2.** The stomach was markedly strained and enlarged and the bulb and the 1<sup>st</sup> and 2<sup>nd</sup> parts of the duodenum were also enlarged on barium X-ray of the upper gastrointestinal system

she was interested in the environment and appeared cachectic. A neurologic examination revealed that her lower extremity muscle strength was 4/5. Examination of the other systems revealed no pathology. Her blood tests revealed no pathology. Gastroscopy was performed and extensive 'dirty' yellow lesions, which were thought to be fungal lesions, were observed in the esophagus starting from the 35th cm (Picture 1).



**Picture 3.** Contrast-enhanced abdominal magnetic resonance imaging reveals that the 2nd part of the duodenum is encircled by the pancreatic tissue in the form of a ring

Biopsies were obtained. The stomach was filled with bilious food residue and the antrum appeared hyperemic. The bulb could not be passed because of stenosis and there was no enlargement in the upper part. Pathologic examination revealed severe esophagitis, candida esophagitis (candida hyphae and spores entering the epithelium) and inactive chronic gastritis. Gram staining revealed yeast cells and *Candida albicans* grew in fungal culture.

Considering the possibility of the presence of stenosis compatible with compression, a barium X-ray of the upper gastrointestinal system was obtained and it was found that the stomach was markedly strained and enlarged and the bulb and the first and second parts of the duodenum were enlarged (Picture 2). Liquid contrast agent passage was markedly delayed and occurred with the pull of gravity in the lower part of the second part in the duodenum. On simultaneous fluoroscopic examination, recurrent reflux of the liquid contrast agent towards the bulb and stomach was noted. Considering annular pancreas, contrast-enhanced abdominal magnetic resonance imaging (MRI) was performed to support the diagnosis (Picture 3). MRI was interpreted in favor of annular pancreas. Subsequently, laparotomy was performed and it was observed that the second part of the duodenum was encircled with the annular pancreatic tissue and this caused obstruction. "Diamond-shaped duodenoduodenostomy" was performed and no complications occurred. The patient was discharged on the 11<sup>th</sup> postoperative day. Written informed consent was obtained from the patient's parents.

## Discussion

The pancreas is normally formed with combination of the anterior and posterior buds of the pancreas in the 4-8th weeks of embryonic life (2). The pathogenesis of annular pancreas is controversial. The most commonly adopted assumption is the Leeco theory (4). According to Leeco, the anterior pancreatic bud adheres abnormally to the duodenum and this abnormal adhesion leads to inappropriate turning of the anterior bud around the second part of the duodenum in the seventh week of embryonal life. It has been proposed that annular pancreas is formed as a result of complete or partial encircling of the second part of the duodenum by the pancreatic tissue in the form of a ring including the main pancreatic duct.

It is difficult to accurately determine the prevalence of annular pancreas. In adults, the prevalence has been reported to be 5-15/100,000 in autopsy series (2).

Although annular pancreas encircles the duodenum completely in adults, food can generally pass through the duodenum without difficulty. However, it may subsequently cause compression or obstruction in the duodenum secondary to chronic pancreatitis and peptic ulcer disease. Preoperative diagnosis is frequently difficult (1). Although our patient had vomiting for the last seven years, her symptoms increased further in the last two months, she lost 8 kg and most probably, the extensive fungal esophagitis found on gastroscopy had deteriorated the clinical picture.

In the diagnosis of annular pancreas, investigations including gastroscopy, barium X-ray, computerized tomography (CT), MRI, endoscopic retrograde cholangiopancreatography (ERCP), and endoscopic ultrasonography are used (5). Gastroscopy, barium X-ray, contrast-enhanced abdominal CT, and MR were used in our patient to make the diagnosis. However, the diagnosis is only made with laparotomy in more than 40% of cases (6). CT and MRI are less sensitive in cases of complete or incomplete annular pancreas (7). The gold standard is laparotomy in the diagnosis of annular pancreas (7).

Similar to our patient, Alahmadi et al. (2) reported a case of annular pancreas in a 20-year-old patient who had had vomiting since childhood and received a late diagnosis.

Annular pancreas is a rare congenital anomaly that is generally asymptomatic and only symptomatic patients are treated surgically (8). The most common complication is gastric outlet obstruction. As a result of this, the most commonly reported symptom is postprandial vomiting. In 90% of cases, the main finding is non-bilious vomiting because the obstruction is most frequently located in the region before the ampulla (5). Our patient had non-bilious vomiting that occurred 5-10 minutes after meals for approximately seven years, in accordance with the literature.

Treatment is ordinarily surgical in symptomatic cases. Direct removal of the annular part is not recommended because of complications including leakage from the duodenum, pancreatitis, pancreatic failure, and pancreatic fistula (2, 3). Surgical treatment generally includes bypassing the duodenum by way of gastro-jejunal anastomosis, side-by-side "duodenal-jejunal bypass" or "duodenal diamond-shaped" anastomosis (4). The best treatment method is most probably "diamond-shaped duodenoduodenostomy" anastomosis because it is more physiologic and causes complications less frequently (3).

In conclusion, the diagnosis of annular pancreas should be considered in patients with prolonged non-bilious vomiting, especially after meals, also considering the fact that it may be observed at any age.

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