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Morphological features of the small intestine: A Case Report

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Abstract

A clinical case an anomaly in the development and position of small intestine is described. A case of characterized by the presence of congenital intestinal malrotation. Morphometric, topographic and X-ray anatomical characteristics of the parts of the small intestine were established.

Keywords: Computer tomography; congenital anomaly of the small intestine; intestinal malrotation; multiplanar reconstructions of CT images.

Introduction

Intestinal malrotation is a congenital anatomical anomaly that occurs as a result of abnormal intestinal flow, consisting in the inability of various parts of the small and large intestine to suspect the correct anatomical position in the abdominal cavity during prenatal development [1].

Intestinal malrotations include various anatomical anomalies and variations ranging from complete lack of rotation to the normal position. Variations are: incomplete rotation, mixed rotation, atypical malrotation and other variants of malrotation. They can be divided into two groups: typical and atypical malrotations, depending on the position of the ligament of Treitz on the right and left from the median line, respectively [5]. The inadequate fixation of the intestine alongside with remaining embryonic fibrous structures, the Ladd's bands, may give rise to a variety of intestinal malfunction, such as intestine volvulus, ischemia and necrosis of the parts of the intestine. As a rule, intestinal malrotation in adults is determined incidentally due to its asymptomatic or non-specific symptoms.

Anomalies in the location of the duodenum can occur not only in congenital disruption of bowel rotation during embryogenesis, but also in various anomalies of intestinal rotation in the fetal development. The anlage of the duodenum occurs at the end of the 4th week of embryogenesis. In embryos 10-12 mm long (5.5-6 weeks), the anlage of the duodenum acquires

a three-layer wall, has the shape of a short arc, convex ventrally and to the right, and is located almost transversely, according to the intensive liver growth. Thus, the anlage of the human duodenum has the shape of a short arc without a clear division into parts. In most fetuses of 9.5-10 weeks of fetal development, the intestine takes on an annular shape and a frontal position due to the relative decrease in the size of the liver, especially the sagittal one, and in most fetuses of 20 weeks - a horseshoe shape. In fetuses 10 weeks and older, there are other forms of the duodenum - U- and V-shaped, oval, with an elongation of the upper part, as variants of the deformation of the main fetal forms (annular, horseshoe-shaped), and the preservation of the embryonic semi-circular shape [2].

The aim of this study was to increase knowledge of this diagnosis by describing anatomy and topography of the parts of the small intestine in adult patient with intestinal malrotation. CT-scans with a high spatial resolution and a good tissue contrast, along with contrast agent, is effective in detecting abnormal location of the small intestine and associated pathologies and provide new possibilities to identify various anatomical aberrations.

In this article, we present a case of an abnormally located duodenum in which the descending part of the duodenum does not rotate to the left, passing into its lower horizontal part, but descends without a sharp anatomical and topographic border, passing into the jejunum [4].

Case presentation

We have observed a 40-year-old man, who underwent multispiral computed tomography (MSCT) of the abdominal cavity in 2023 at the University Clinic. The patient, 40 years old, was diagnosed and admitted to a university clinic with congenital intestinal malrotation. The medical chart was scrutinized, and clinical outcome of performed contrast enhanced computer tomography was reviewed. The diagnosis was established in patient after radiological investigation. During the analysis of the medical chart, the patient complained of severe pain in the abdomen. After collecting anamnesis, we found that the patient was suffering from chronic intermittent abdominal pain, bloating, alternating constipation and diarrhea, and weight loss. After computed tomography of the abdominal organs and angiography of the abdominal vessels, a case of an abnormal structure and position of some sections of the small intestine was established. CT-scan with contrast of the abdomen and pelvis demonstrated small bowel mesenteric swirling and descending duodenal transition point.

The anatomical and topographic description of the duodenum looked as follows: the duodenal bulb was located typically along the mid-clavicular line on the right at the level of the body of the 12th thoracic vertebra, expanded to 38x43 mm, then the intestine made a right angle turn and passed into the descending part of the duodenum, the intestine was directed vertically down from the body of the 12th thoracic vertebra to the lower edge of the first lumbar vertebra to the right of the head of the pancreas (along the midclavicular line on the right). Making the second turn at a right angle, the duodenum passed into the horizontal part. This part began typically at the level of the intervertebral disc between the first and second lumbar vertebrae was typically located for 45 mm, then, without reaching the anterior midline, it twisted in a spiral anteriorly, posteriorly and to the right around the pancreas - duodenal artery - at the level of the upper third of the body of the second lumbar vertebra. Then it went down and is located vertically at the level of the right midclavicular line and then passed into the jejunum at the level of the fourth lumbar vertebra in the right iliac region. When there is an incomplete turn of the intestine in the embryonic period, the descending part of the duodenum does not turn to the left and does not pass into its intended horizontal part, descends and passes into the jejunum without a sharp topographic anatomical border.

Conclusion

Intestinal malrotation is a congenital anomaly diagnosed in both children and adults. Intestinal malrotation shall be regarded as a malformation defined by any deviation from the normal 270 degree counterclockwise turn of the intestine. Correctly performed contrast-enhanced computed tomography reveals malformation and allows obtaining morphometric, topographic and X-ray anatomical characteristics of the small intestine. Clinicians should consider intestinal malrotation in adults with recurrent vague abdominal symptoms.

The clinical case of an abnormally located duodenum, which we have considered in detail, was confirmed by the fact that when the intestinal rotation is incomplete during embryogenesis, the descending part of the duodenum does not turn to the left, passing into its lower horizontal part, but descends down a non-sharp anatomical and topographic border, passing into the jejunum.

The clinical significance of intestinal malrotation anomalies consists in several important features: the absence of clear boundaries of the horizontal and ascending parts of the duodenum, an abnormally located or poorly expressed duodenojejunal flexure, the presence of Ladd's peritoneal ligaments causing obstruction of the duodenum, and a narrow fixation of the base of the mesentery, exposing the superior mesenteric artery and vein to the risk of bloat[3]. Our case adds a new perspective to the scientific literature and we bring this rare disease to the attention of physicians, clinicians and researchers.

Conflict of interest

None.

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