

# A Rare Anomaly of Duodenum: A Case Report

Rekha Lalwani, Sunita Athavale, and Sheetal Kotgirwar

Department of Anatomy, All India Institutes of Medical Sciences, Bhopal (M.P.), India

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**Abstract-** Anatomical variations of duodenum such as atresia, stenosis, and variations in shape have been described by various authors, but the existence of a gross anomaly in shape and position of midgut segment of the duodenum is rare. Few reported cases of duodenal anomalies date back to early twentieth century. In the wake of advancement of imaging techniques and minimal access surgeries, authors report a case of a rare duodenal anomaly. The reported case assumes significance because of the possibility of misinterpretation of radiological images which has been discussed while citing such references. The present case reports an anomaly of the position of the midgut segment of the duodenum in an adult female cadaver. It was observed that the lower half of second part of duodenum was coiled like a serpent on the upper pole of right kidney. This part coursed initially upwards running parallel and to the right of the upper half of the second part of the duodenum. The third part coursed downwards and to the left, posterior to head and neck of pancreas, in its course sandwiching the commencement of portal vein.

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## Introduction

Congenital anomalies of duodenum are considered to be rare (1). Standard textbooks of anatomy describe duodenum as most predictably placed part of the small intestine. The duodenum forms an elongated “C” that lies between the level of first and third lumbar vertebra in the supine position. The lower limb of ‘C’ extends further to the left of midline than the upper limb. The head and uncinate process of pancreas lie within the concavity of “C” (2). Hollinshead (3) describe the duodenum as a normally disposed more or less of a curve, which typically varies that from a “C” to that of an “O” or may present rather sharp angles so that it resembles a “U” or a “V” (3). Knowledge of the variation in shape and position of the duodenum is of value to endoscopist, surgeons, and radiologists for interventional procedures, preventing misinterpretation of an abnormally shaped duodenum. The present case reports a rare duodenal anomaly of shape and position with its embryological basis and clinical implications.

## Case Report

During routine dissection for first-year medical

students, the Anatomy of midgut portion of the duodenum was found to be deranged in an adult female cadaver. The region was carefully dissected. The morphology was studied in detail with special reference to its position, shape of duodenum and location of other structures close to it.

The first part of duodenum was disposed of normally. The upper half of the second part coursed downwards abutting the upper part of the head of the pancreas and was related to kidney posteriorly. The distal half of the second part took a serpentine bend on the upper pole of right kidney and coursed upwards running parallel and to the right of the upper half till it reached posterior to the first part. Here onwards the third part coursed downwards and to the left, posterior to head and neck of the pancreas (Figure 1a,b). In its course, it passed posterior to the commencement of portal vein. Posterior to the neck of pancreas the formation of the portal vein was sandwiched between the neck of pancreas anteriorly and the third part of duodenum posteriorly (figure 2). An extension of pancreatic tissue from the head of the pancreas also encroached between the vein and the duodenal wall. The duodenum emerged below the lower border of pancreas just lateral to the uncinate process and continued downwards till the

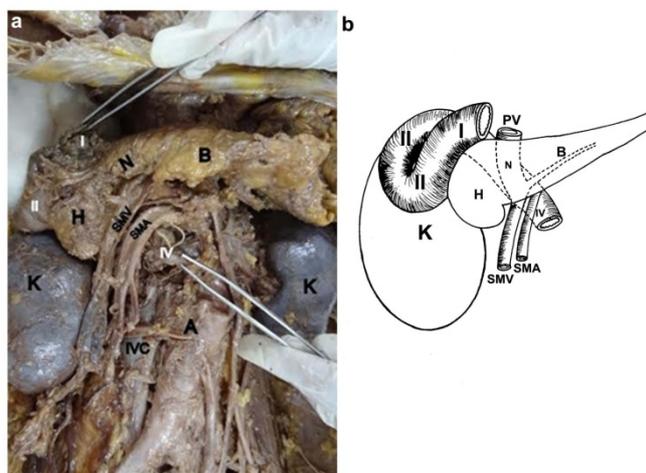
**Corresponding Author:** R. Lalwani

Department of Anatomy, All India Institutes of Medical Sciences, Bhopal (M.P.), India

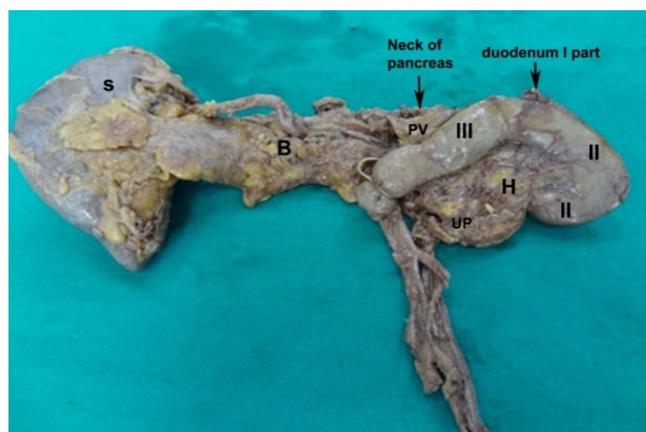
Tel: +94 25 609701, Fax: +94 25 000000, E-mail address: rekha.anatomy@aiimsbhopal.edu.in

duodenojejunal flexure. Here it was crossed by the superior mesenteric vessels (Figures 1a,1b). The

distinction between the third and the fourth part could not be ascertained.



**Figure 1a).** Shows the first part of the duodenum (I) and the upper half of the second part (II) disposed of normally abutting the upper part of the head of the pancreas (H). The distal half of the second part (II) is taking a serpentine bend on the upper pole of right kidney. The fourth part (IV) emerged below the lower border of pancreas just lateral to the uncinate process and posterior to the Superior mesenteric vessels (SMV, SMA). Also seen is an accessory renal artery from the aorta (A) just above the origin of the Inferior mesenteric artery. B- Body of the pancreas; IVC-Inferior venacava; N- neck of the pancreas. **b).** Schematic diagram showing the disposition of duodenum as observed in the present case. Note the serpentine bend of the distal half of second part (II) on the upper pole of the right kidney (K). The third part (III) is seen running posterior to the pancreas and portal vein (PV). B- Body of pancreas; H- Head of the pancreas; IVC-Inferior venacava; N- neck of pancreas; SMA- Superior mesenteric artery; SMV- Superior mesenteric vein



**Figure 2.** Posterior view of the duodenum, pancreas, and spleen(S) removed en bloc. note that distal half of second part (II) runs upwards and reaches posterior to the first part (I). Here onwards the third part slopes downwards and to the left posterior to the pancreas sandwiching the portal vein (PV) in its way. B- Body of pancreas; H- Head of the pancreas; UP-Uncinate Process

The lower part of the head of the pancreas lay in direct contact with the lower part of the hilum of the right kidney. The upper pole of the right kidney and the adjacent surface was occupied by the serpentine coiled loop of the duodenum. Consequently, the right suprarenal was located higher up in the right paravertebral gutter plastered to the posterior abdominal wall. The right kidney occupied a slightly lower position with an upper pole at the level of first lumbar and lower

pole at fourth lumbar. The right renal vessels coursed obliquely downwards and to the right to reach the hilum. An accessory renal artery was also found just above the origin of the inferior mesenteric artery; it coursed horizontally towards the lower pole of the kidney.

The bile and pancreatic duct opened normally at the junction of foregut and midgut segment of duodenum between the two layers of vasa recta.

## Discussion

The duodenal anomaly in the present case was observed in an old female cadaver presumably above the age of fifty years. This suggests that the present anomaly must not have been a cause of any major morbidity or mortality. However, it calls for attention especially in the era of imaging, endoscopy and increased surgical expertise.

An imaging study of such a case has a great

possibility of misinterpretation. Authors feel that the case described by Dousei *et al.*, (1), is very similar to the present case. They described a 58-year-old female presenting with epigastralgia and liver dysfunction for three months. Work up for the symptoms revealed unusual configuration of the duodenum. The images (Barium meal, duodenography, and C.T. Scan) were interpreted. Table 1 gives the interpretation of the images by Dousei *et al.*, (1) and also our deduction related to the images:

**Table 1. The analysis of the images by Dousei *et al.*, (1) and also authors deduction related to the images**

	Interpretation of images by Dousei <i>et al.</i> ,	Author's deduction of images in the light of the present case
1	Obstruction of the second part of duodenum distal to major duodenal papilla	Absence of image of distal II part may be interpreted as obstruction
2	Dilatation and diverticulum of the proximal portion of the second part	Since the distal portion of second part ran almost parallel to the proximal part, a parallel slightly overlapping shadow on contrast may be interpreted as dilatation
3	Third part of duodenum in communication with the first part through its posterior wall	The third part commenced posterior to the third part (although no communication), but the shadow may be interpreted as communication with the first part. Such interpretation also justifies the presence of dye beyond the second part which is already interpreted as obstructed.
4	Continuing posterior to pancreas and portal vein	Same as Dousei <i>et al.</i> , (1)

The patient was diagnosed to have gall stones which justify her symptoms. The patient also underwent a gastrojejunostomy to bypass the duodenum.

Authors feel that the present case is also likely to interpret as the case by Dousei *et al.*, (1) in the absence of an autopsy.

While duodenal obstruction and atresia are common but communication between the first and third part of the duodenum is embryologically not tenable. Hence knowledge of such rare occurrence and its embryological genesis both are of significance.

### Embryological basis

Saunders and Lindner 1940 (4), while discussing three cases of duodenal anomalies have described in detail four stages of development of duodenum. The first stage is rudimentary duodenal portion distal to fusiform stomach showing the development of pancreatic and hepatic buds. The anomalies of development in this stage will be pertaining to biliary apparatus and pancreas.

The second stage is characterized by the formation of horizontally placed 'U' shaped loop. The upper limb of 'U' is the first part; the acute bend is the future second

part and the lower limb future third and fourth part. The lower limb of 'U' ends in another acute bend just anterior to mesonephros which is the future D-J flexure. The anomalies of this stage are rare.

The third stage is characterized by rapid development and elongation of the second part and slightly later of the third and fourth part. Besides atresia, the anomalies of position and shape of duodenum are the result of disruption of this stage. Reasons may be

- a) Rapid premature elongation of second, third and fourth part/s (midgut portions),
- b) Big enlarged live,
- c) Premature return of umbilical loop to the abdominal cavity.

These situations result in a lack of space in the 'still expanding' abdominal cavity thereby resulting in malrotation and malposition.

Few similar cases of alteration of shape and position of duodenum have been described in literature (1,5-10). A more severe form of such anomaly was described by Saunders and Lindner (4) in a three year and female child at autopsy where the midgut portion of the duodenum was highly convoluted resulting in duodenal obstruction and death.

Various radiological studies carried out in Denmark

## Gastrointestinal bleeding because of hemosuccuspancreaticus

(11-14) have reported abnormality of the duodenal loop in reference to shape to be very common ranging from 21% (14) to 54% (11). Authors are of the belief that minor variations of the shape of II part as described by Hollenshead (3) are relatively very common and are of no functional significance.

These findings may be of value to radiologist interpreting the images, endoscopist entering the upper GI or surgeons operating in this region for any reason. This lack of knowledge may lead to misinterpretation of radiological images.

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