

# A rare presentation of duodenal diverticulum: case report

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## SUMMARY

The gastrointestinal tract is more susceptible to the development of diverticula. Duodenum, next to colon is the common site for diverticula. This case reports the presence of a single extramural diverticulum at the junction of a horizontal and the ascending part of the duodenum in an adult female cadaver during a routine dissection procedure. Suspensory ligament of duodenum containing suspensory muscle of duodenum was found attached to the basal aspect of the diverticulum. Though most of the duodenal diverticula are asymptomatic, awareness of its presence play a major role in treating the complications.

**Key words:** Duodenal diverticulum – Ligaments – Extramural diverticulum

## INTRODUCTION

A diverticulum is a protrusion of a mucous membrane or other layers from the lumen of a hollow viscera of the body without any identifiable cause of intrinsic or extrinsic disease. The most common site for the occurrence of diverticulum in the small intestine is Duodenum followed by jejunum and ileum (Standring, 2016). Classification of the duodenal diverticula can be based on a) location of the protruding part (extramural or intramural) and b) presence of muscle coat along with other layers of duodenal wall (true/congenital or false/ acquired) (McKenzie and Evers, 2012). Most frequently occurring extramural diverticula are false diverticula or pseudodiverticulum located near to the ampulla of Vater in the descending part of the duodenum (Kua et al., 2005). This article reports an un-

common case of an extramural diverticulum occurring in the pancreatic border of horizontal part of the duodenum.

## CASE REPORT

During a routine academic dissection of the abdomen as per the procedure described in Cunningham's manual for the undergraduate students, a diverticulum was found at the junction of horizontal and ascending part of duodenum in a female cadaver aged 62 years in the Department of Anatomy, Jawaharlal Institute of Postgraduate Medical Education and Research, Karaikal, Puducherry, India. It was a solitary, globular extramural diverticulum observed on the superior border at the junction of a horizontal and ascending part of the duodenum (Fig. 1). The diverticulum was about 4 cm in length and 5 cm wide at the base without any ulceration or any other definitive abnormalities. It was located 18 cm from the pyloric sphincter and 3 cm from duodenojejunal flexure. It was related on the right side to superior mesenteric vessels, on the left side to the inferior mesenteric vein and superiorly to the body of the pancreas. The distal end of the Suspensory muscle of Duodenum was found attached to the base of the diverticulum and the ascending part of the organ. On close inspection, no muscle fibers of suspensory ligament of duodenum were found attached to the duodenojejunal flexure.

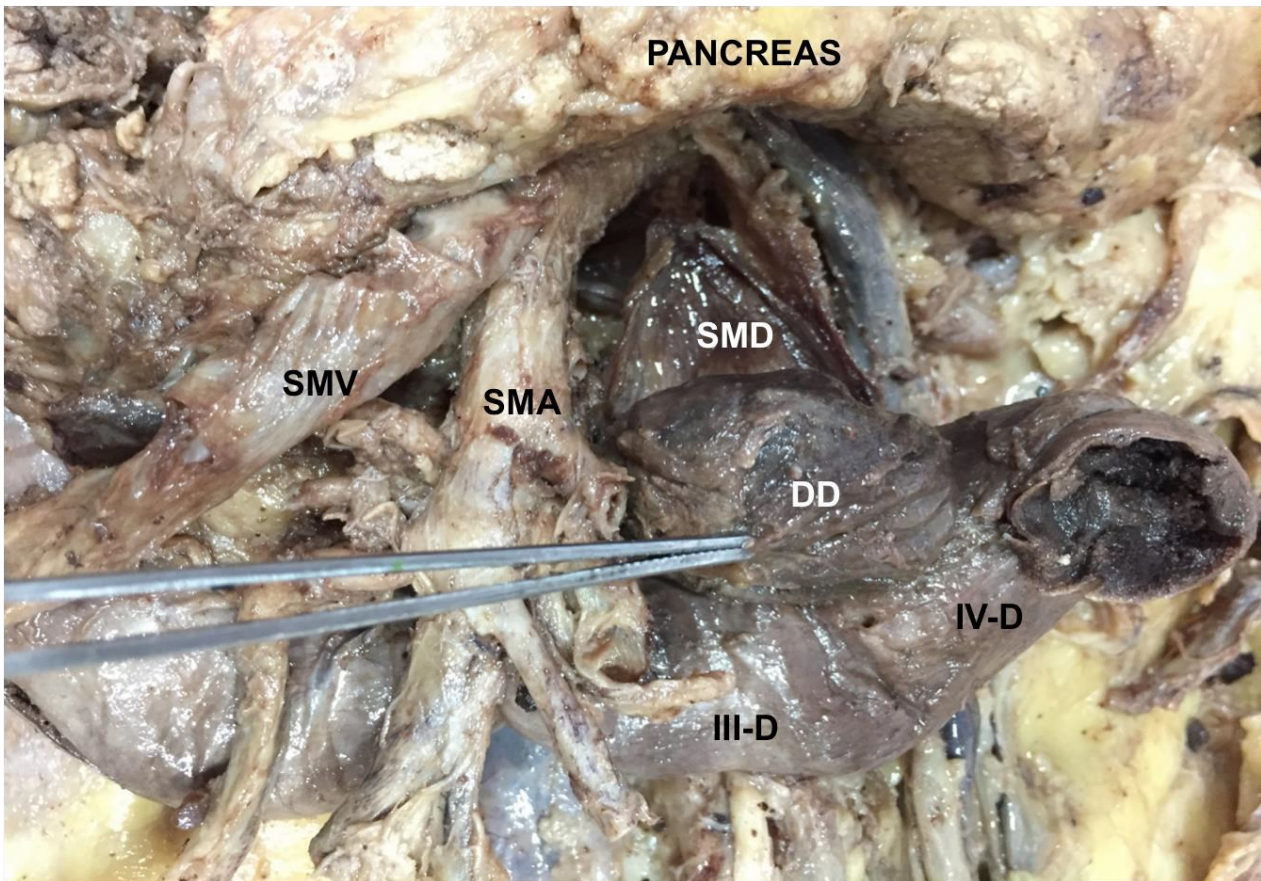
Duodenum and pancreas en block was removed by meticulous dissection and the cut specimen was fixed in formalin. A horizontal incision was made in the inferior border of the horizontal part of the duodenum for detailed examination. The interior of the duodenum showed numerous circular folds. There were neither any signs of necrosis / ulceration of mucosa or fluid collection inside the luminal cavity. Close to the concave superior border of the horizontal Part of duodenum, a single

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Submitted: 11 October, 2018. Accepted: 8 January, 2019.



**Fig 1.** Photograph showing the relations of the in-situ duodenal diverticulum (DD) at the upper margin of the horizontal and the ascending part of the duodenum (III-D) and associated suspensory muscle of duodenum (SMD). SMV: Superior mesenteric vein; SMA: Superior mesenteric artery; IV-D: Forth part (ascending) of duodenum.

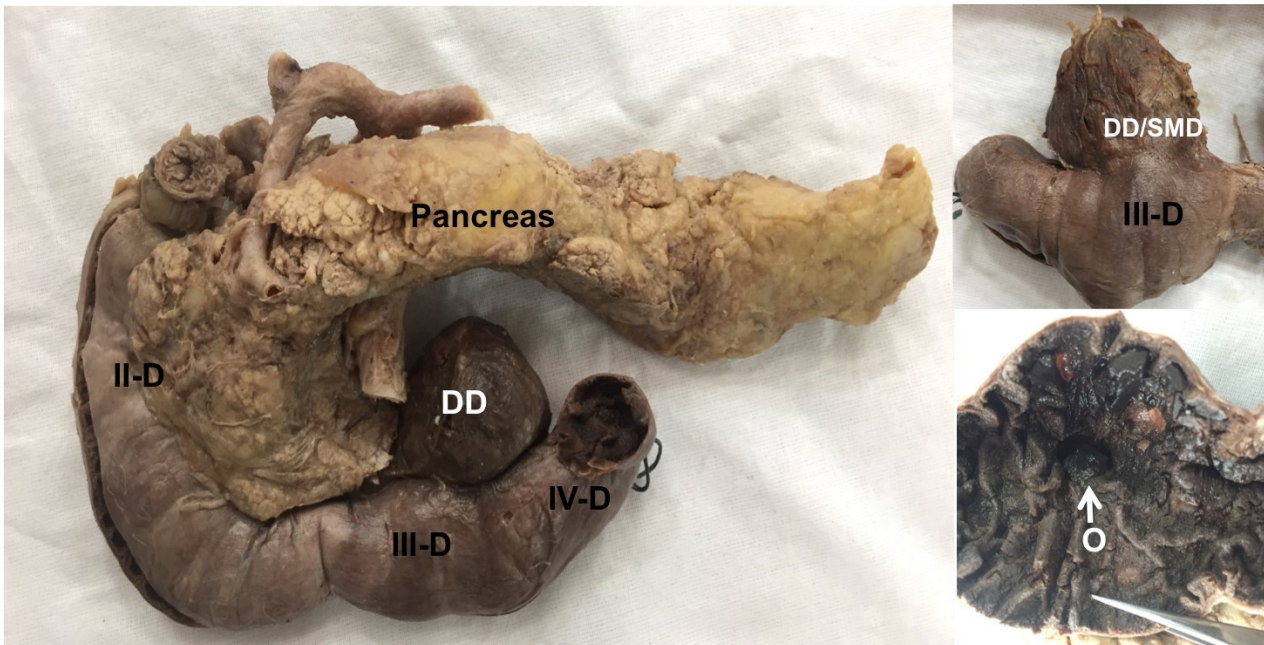
opening of the diverticulum was visualized. It was a valveless opening of diameter 6 mm and had a communication into the lumen of the third part of duodenum (Fig. 2). The lumen of the diverticulum contained undigested food particles. No branches of the superior mesenteric vessels were observed adjacent to the lumen or wall of the diverticulum. The fundus of the diverticulum has no connection with the suspensory muscle through its lumen. The thickness of the wall of the diverticulum was found to be less than the wall of the duodenum. So it can be presumed that this diverticulum is a false / secondary diverticulum but confirmation based on histology was not done due to tissue damage. Nevertheless the medical history of the subject was unknown.

## DISCUSSION

Chomall was the pioneer who described the presence of duodenal diverticulum in the early 18<sup>th</sup> century (Lotveit et al., 1988). The extramural diverticulum is a sac protruding from the outer aspect of the duodenal wall and it contains only the mucosal and sub-mucosal layers herniating through the muscle wall defect. The causes of muscle wall weakness can be attributed to the a) Passage of

the associated blood vessels and b) Presence of higher intraluminal pressure and delayed bowel transit time resulting in “pulsion” type of diverticulum (Crowe et al., 2011; Wilhelmssen et al., 2014). Depending on the location of diverticulum near to the major duodenal papilla, there are two types of extramural diverticulum – Periampullary and Juxtapapillary. There lies uncertainty in assessing the actual prevalence of duodenal diverticulum as it is based on the mode of diagnosis. The prevalence rate is found to be 1-6% in roentgraphic studies using barium and 12-22% by ERCP method (Zoepf et al., 2001). Data obtained from cadaveric studies and autopsy (Akhrass et al., 1997) demonstrated a higher prevalence of duodenal diverticula when compared to the contrast studies as most of them are asymptomatic and the highest reported incidence from the cadaveric study is found to be 31.8% (Minoru and Atsuyoshi, 1973). Though the size of the diverticulum increases in size through years, it appears smaller in the cadavers due to the shrinkage caused by the embalming process (Sakthivel et al., 2013).

Comparing the incidence of occurrence of diverticulum from various parts of the duodenum, it is proved that 90% arise from the second or descending part of the duodenum (medial wall), 3% from the lateral wall of the descending part and



**Fig 2.** Photograph showing the cut and fixed specimen of duodenum and pancreas showing the duodenal diverticulum (DD). II-D: Descending part of Duodenum, III-D: Horizontal part of the duodenum, IV-D: Ascending part of the duodenum, DD: Duodenal Diverticulum, SMD: Suspensory muscle of Duodenum, O: Opening of the duodenal di-

ascending part (Saleena et al., 2017). Spriggs and Marxer (1926) observed by radiological examination that 16 out of 51 cases (31.3%) had diverticulum in the horizontal part of duodenum. The present case report showing diverticulum at the junction of the horizontal and the ascending part of the duodenum is also supported by the observations of Bincy et al. (2012). The occurrence of duodenal diverticula is more common in females and the vulnerable age is above 50 years (Saleena et al., 2017).

Persons with duodenal diverticula may present occasionally with any of the following symptoms such as abdominal discomfort, pain, diarrhea, and melena. If symptoms are produced, the causal factors can be either mechanical or inflammation or cancerous growth. Pain is felt in the midline in patients presenting a diverticulum in the horizontal part or ascending part of the duodenum due to its distension (Mackenzie et al., 1996). Complications like pancreatitis, cholangitis are not uncommon in case of duodenal diverticulitis (Mahajan et al., 2004). Diverticular ulceration or extravasation of the blood vessel through the diverticulum attribute to 0.14% of upper GI bleed (Rizwan et al., 2011). An unusual and most dreaded complication is the perforation of the diverticulum retroperitoneally which warrants immediate surgical treatment (Chen et al., 2007).

In spite of current techniques like Upper Gastrointestinal Endoscopy, Computed Tomography (CT) and Magnetic Resonance Cholangio Pancreatography (MRCP) being employed in diagnosing the duodenal diverticular disease (Mahajan et al., 2004; Rizwan et al., 2011), identifying a diverticulum situated in the horizontal or ascending part of

duodenum still remains a challenge. However, in cases of active bleeding, the investigation of choice would be CT-Angiography or bleeding scintigraphy in combination with upper GI endoscopy and colonoscopy (Wilhelmsen et al., 2014). Perplexity still exists with regard to treatment modalities of the duodenal diverticulum. The asymptomatic diverticulum can be left unaided whereas intervention is preferred when complications occur. The choice of intervention depends on the nature of the complication followed by diverticulectomy with minimal damage to the adjacent organs (Chen et al., 2007). A thorough examination of the duodenum during an emergency exploratory laparotomy of the abdomen is necessary to manage the alarming symptoms of traumatic blow out of the diverticulum as a life-saving measure (Papalambros et al., 2005).

## CONCLUSION

This case report is one of the rare entity which involves the presence of duodenal diverticulum in the inner pancreatic border at the junction of the horizontal part of duodenum associated with the suspensory muscle of duodenum. Such occurrence of diverticulum at the rare site is barely reported, even in the studies dedicated to the diverticular diseases. Knowledge of this variation is essential during endoscopic procedures for surgeons and radiologists and finally for surgeries related to pancreas and colon, as it may be the hidden cause of the bleeding.

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