

Unduly extensive uncinate process of pancreas in conjunction with pancreatico-duodenal fold

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Abstract: Anatomical variations of pancreatic head and uncinate process are rarely encountered in clinical practice. These variations are primarily attributed to the complex development of the pancreas. An unduly enlarged uncinate process of the pancreas overlapping the third part of duodenum was discovered during dissection. This malformation of the pancreatic uncinate process was considered to be due to excessive fusion between the ventral and dorsal buds during embryonic development. On further dissection, an avascular pancreatico-duodenal fold guarding the pancreatico-duodenal recess was observed. The enlarged uncinate process can cause compression of neurovascular structures and also cause compression of adjoining viscera. The pancreatico-duodenal recess becomes a potential site for internal herniation. This case is of particular interest to the gastroenterologists and surgeons performing surgical resections. Precise knowledge of embryogenesis of such pancreatic anomalies is necessary for understanding and thus treating many diseases of the pancreas.

Key words: Pancreas, Uncinate process, Hypertrophy, Recess

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Introduction

The uncinate process is a prolongation at the junction of the lower and left lateral border of the pancreatic head. The word “uncinate” comes from the latin “uncinatus,” meaning “hooked” [1]. The pancreas develops from the two endodermal buds which arise from the caudal part of the foregut [2]. Most of the pancreas is derived from the larger dorsal pancreatic bud which appears first and lies cranial to the ventral bud. The smaller ventral pancreatic bud develops near the entry of the bile duct into the duodenum and grows between the layers of the ventral mesentery. After the

rotation of the duodenum to the right side, the ventral bud lies posterior to the dorsal bud and later fuses with it. The dorsal pancreatic bud becomes the upper part of head, neck, body and tail of the pancreas and the ventral pancreatic bud forms the lower part of pancreatic head and uncinate process [3]. Malformations of the pancreatic uncinate process have been attributed to excessive fusion between the ventral and dorsal analogues during embryonic development [4]. A basic understanding of the embryologic development and normal anatomy of the pancreas and biliary tree is therefore essential for identifying these anomalies.

Numerous anatomical anomalies of the pancreas and the pancreatic ductal system are commonly encountered during radiological assessment. These pancreatic variants may simulate various neoplastic, inflammatory and post-traumatic conditions. Anatomical variations, developmental anomalies (e.g., pancreas divisum, annular pancreas, ectopic pancreas, pancreatic agenesis and hypoplasia) [5] and congenital diseases (congenital pancreatic cysts, von Hippel-Lindau disease, choledochal cysts) can all pose a diagnostic

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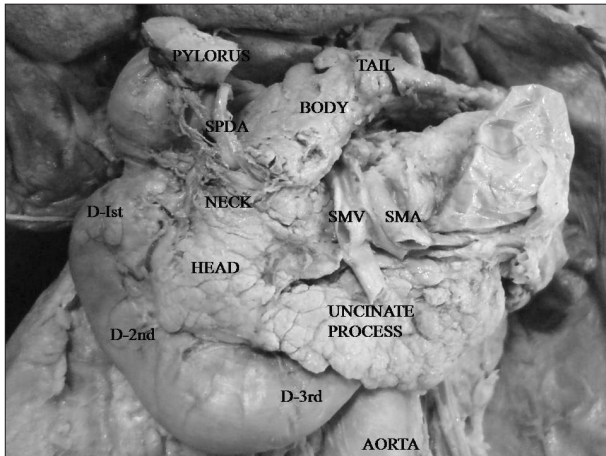


Fig. 1. Showing the enlarged uncinata process. D-1st, 1st part of duodenum; D-2nd, second part of duodenum; D-3rd, third part of duodenum; SMA, superior mesenteric artery; SMV, superior mesenteric vein; SPDA, superior pancreaticoduodenal artery.

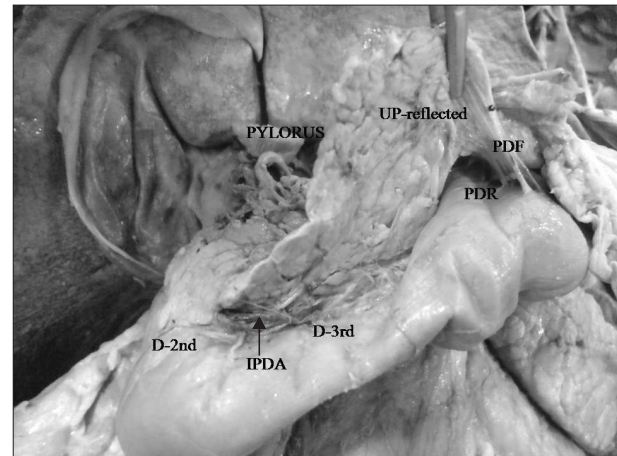


Fig. 2. Showing the pancreaticoduodenal fold and recess. UP, uncinata process; IPDA, inferior pancreaticoduodenal artery; PDF, pancreaticoduodenal fold; PDR, pancreaticoduodenal recess.

challenge for the clinicians [6]. Such anomalies should be borne in mind during differential diagnosis for abnormal conditions of pancreas and its associated structures. To the best of our knowledge such variant disposition of pancreatic head and uncinata process has not yet been reported during pancreaticoduodenectomy. It could be significant during surgical resection and pancreaticojejunostomy.

Case Report

We encountered a rare variant in the constitution and disposition of pancreas in an adult male cadaver during the course of preclinical educational training program for undergraduate medical students. The pancreas displayed a usual J-shaped profile with unduly large uncinata process. The head of the pancreas was not confined to the concavity of duodenum. The enlarged uncinata process was found overlapping the third part of duodenum and a small peritoneal fold was observed connecting the inferior surface of the head of the pancreas to the left extremity of the third part of duodenum (pancreaticoduodenal fold) (Fig. 1). The head of the pancreas measured 4.5 cm in length and 6 cm in its maximum width. An unusual recess (pancreaticoduodenal recess) was formed bounded by the posterior surface of the enlarged uncinata process, anterior surface of the distal portion of third part of duodenum and the pancreaticoduodenal fold (Fig. 2). It measured 1.6 cm in length, 2 cm in breadth, and 2 cm in depth. On further

exploration, the duodenopancreatic fold was found to be avascular. The enlarged head and uncinata process received vascular supply from inferior pancreaticoduodenal artery. The superior mesenteric vessels were related anteriorly to the uncinata process of pancreas. The pancreas displayed normal consistency and was not adherent to the underlying structures. The neck, body and tail of pancreas displayed normal anatomy.

Discussion

The pathological changes of the pancreas are occasionally related to its embryological development. Abnormal pancreatic developmental stages are associated with a variety of diseases of the gland. Pancreatic disorders can be classified as those affecting the ductal system and those related to the parenchyma of the gland [7]. Precise knowledge of the embryogenesis is necessary to the understanding and thus the treatment of many diseases of pancreas. One of the most interesting but rarely documented variations of the pancreas is hypertrophied uncinata process which may be due to excessive fusion between the ventral and dorsal buds during embryonic development [4]. The anomaly encountered in the current investigation could also be viewed as a consequence of deranged fusion of ventral and dorsal pancreatic buds. Sometimes the pancreas fails to develop normally and there may be congenital defects associated with the uncinata process. There are several instances of abnormal development of the pancreatic uncinata process, such as an annular

pancreas, pancreas divisum [8]. Similarly, portal annular pancreas is another interesting anatomical anomaly in which the pancreatic tissue surrounds the superior mesenteric vein and portal vein like a ring but in a few cases the uncinete process of the pancreas has been found forming this ring [9]. These types of cases have to be considered carefully during pancreatic resections.

It is important for surgeons to acquaint with the anatomical relations of the uncinete process of the pancreas especially with the superior mesenteric vessels to avoid unwanted iatrogenic complications. The uncinete process, unlike the remainder of the organ, passes posterior to the superior mesenteric vessels [10]. In the present study, the hypertrophied pancreatic tissue was observed to overlap the third part of the duodenum and was directly related to the superior mesenteric vessels and abdominal aorta. This may be responsible for compression of the surrounding neurovascular structures. The etiology of such pancreatic hypertrophy is usually congenital but can seldom be acquired [2]. It may result in clinical complications like obstruction of the duodenum or pancreatitis. Additionally, as also seen in Annular Pancreas, complications such as obstructive jaundice, peptic ulcer, duodenal perforations and peritonitis may result [11].

The peritoneal fold encountered in the present investigation is an additional interesting observation. It connected the head of pancreas with the third part of duodenum and therefore, it is justifiably designated as pancreatico-duodenal fold. Further, the recess formed as a consequence can be referred to as pancreatico-duodenal recess. Understandably, it possibly can be an occult site for internal herniation and can cause diagnostic and intra-operative dilemma. Laparoscopic investigations are gaining popularity especially of the abdominal region. In the event of the presence of such congenital malformations it becomes imperative to acquaint oneself with possibility related to faulty embryogenesis.

Further, this may avoid intra-operative complications.

In conclusion, endoscopists and surgeons should give utmost importance to such a rare pancreatic anomaly during diagnostic and therapeutic procedures. This report will be a significant addition to the present anatomical literature.

References

1. Arnold's glossary of anatomy by Dr. M. A. (Toby) Arnold [Internet]. Sydney: The University of Sydney; [cited 2014 Nov 1]. Available from: <http://www.anatomy.usyd.edu.au/glossary/glossary.cgi?page=u>.
2. Nayak S, Pamidi N, George BM, Guru A. A strange case of double annular pancreas. *JOP* 2013;14:96-8.
3. Moore KL, Persaud TV. The developing human: clinically oriented embryology. 8th ed. Philadelphia: Saunders; 2008. p.264-5.
4. Sugiura Y, Shima S, Yonekawa H, Yoshizumi Y, Ohtsuka H, Ogata T. The hypertrophic uncinete process of the pancreas wrapping the superior mesenteric vein and artery: a case report. *Jpn J Surg* 1987;17:182-5.
5. Kozu T, Suda K, Toki F. Pancreatic development and anatomical variation. *Gastrointest Endosc Clin N Am* 1995;5:1-30.
6. Morteale KJ, Rocha TC, Streeter JL, Taylor AJ. Multimodality imaging of pancreatic and biliary congenital anomalies. *Radiographics* 2006;26:715-31.
7. Adda G, Hannoun L, Loygue J. Development of the human pancreas: variations and pathology. A tentative classification. *Anat Clin* 1984;5:275-83.
8. Fulcher AS, Turner MA. MR pancreatography: a useful tool for evaluating pancreatic disorders. *Radiographics* 1999;19:5-24.
9. Joseph P, Raju RS, Vyas FL, Eapen A, Sitaram V. Portal annular pancreas: a rare variant and a new classification. *JOP* 2010;11:453-5.
10. Uncinate process of pancreas [Internet]. Wikipedia; [cited 2014 Nov 1]. Available from: http://en.wikipedia.org/wiki/Uncinate_process_of_pancreas.
11. Patra DP, Basu A, Chanduka A, Roy A. Annular pancreas: a rare cause of duodenal obstruction in adults. *Indian J Surg* 2011;73:163-5.