

Anatomical variation in the insertion of the major duodenal papilla

Franco, SSDR.*, Mendes, LFM., Fortes, LHS., Siqueira, SL. and Souza, IKF.

Techniques and Experimental Surgery Laboratory, Department of Medical Sciences,
Federal University of Ouro Preto – UFOP, Rua Paulo Magalhães Gomes, s/n, Bauxita,
Campus Morro do Cruzeiro, CEP 35400-000, Ouro Preto, MG, Brazil

*E-mail: stephaniedufflesfranco@gmail.com

Abstract

Introduction: The major duodenal papilla is usually located about eight centimeters distant from the pyloric ostium, in the descending portion of the duodenum. However, it is known that the distance of the papilla insertion may vary, and the ducts may not unite or not form a papillary structure. We describe the ectopic major duodenal papilla in two corpses owned by the Human Anatomy Laboratory at the Federal University of Ouro Preto. **Materials and methods:** Two corpses that had suffered prior formalinfixation were dissected and after the visualization of the anomalous character of the structures the distance from the pylorus was measured in each of them. In one of the corpses the major duodenal papilla was 5.2 cm distant from the pyloric ostium, lying posteromedial at the beginning of the upper duodenal flexure, while in the other one it was 6.7 cm distant from the pyloric ostium, lying posteromedial at the end of the upper duodenal flexure, between the first and second duodenal portions. A literature review of prevalence and surgical importance of this variation was performed through PubMed database and in anatomy and surgery textbooks. **Results and conclusion:** Dowdy and Disibeyaz described this type of variation and found 4% and 0,43% in their study, respectively. These anatomic variation findings are mainly relevant in surgeries of the biliary tract and pancreatic ducts and of the duodenum. A procedure in this case could inadvertently injure retroduodenal structures related to the ectopic papilla, increasing the rates of unsuccessful procedures, morbidity and mortality.

Keywords: duodenal papilla, major; ampulla of vater; duodenum; hepatic duct, common; duct of wirsung.

1 Introduction

The major duodenal papilla (papilla of Vater) is a conical eminence that measures five to ten millimeters in length and five to six millimeters wide, usually located in the posteromedial wall of the second duodenal portion, the descending duodenum, between the gallbladder lap and the bottom of the pancreas head, usually eight centimeters distal from the pylorus (HORIGUCHI and KAMISAWA, 2010). It is surrounded by a sphincter (sphincter of Oddi) and joins the duodenal wall hereinafter by a vertical fold, called the papilla frenuli (HORIGUCHI and KAMISAWA, 2010; LINDNER, PENA and RUGGERI, 1976; MONTEIRO and SANTANA, 2006; TESTUT and JACOB, 1947).

The common bile duct or choledochal duct can be divided into three parts: retroduodenal, retropancreatic and intraparietal. The retroduodenal portion of the duct is posterior and not adhered to the duodenum, prior to the inferior vena cava, and lateral to the portal vein. Next, the retropancreatic portion continues by the bottom edge of the first part of the duodenum and posterior to the pancreas head to the site of penetration in the second duodenal portion. The intraparietal part consists of a stretch of approximately 15 mm, within the duodenal wall thickness. The main pancreatic duct or duct of Wirsung goes through the tail to the head of pancreas. It crosses the pancreas head and the duodenal wall, superiorly relating to the common bile duct (MONTEIRO and SANTANA, 2006; TESTUT and JACOB, 1947).

Both ducts end in the major duodenal papilla, generating in approximately 70% the cases an excavation in the luminal region of the intestine, known as the ampulla of Vater. This structure is circumscribed by the sphincter of Oddi, which plays a considerable role in digestion by regulating the discharge of pancreatic juice and bile into the duodenal light (HORIGUCHI and KAMISAWA, 2010).

However, there were some anatomical variations of this structure described in the literature. The major duodenal papilla may not be present, being replaced by a simple orifice common to the choledochal duct and Wirsung duct or two separated openings (HORIGUCHI and KAMISAWA, 2010). Given the importance of physiological and anatomical correlations of the papilla of Vater, there is a special interest in anatomical variations of this structure with surgical applicability.

2 Case report

During the dissection of two corpses, one melanoderm male (corpse 1, Figure 1) and one melanoderm female (corpse 2, Figure 2), belonging to the Federal University of Ouro Preto, after opening and exposure of the small bowel it has been observed the insertion of major duodenal papilla upper to the second duodenum portion in both of them. The corpse 1 has suffered prior formalinfixation, being the major duodenal papilla dissected only after years of this process.

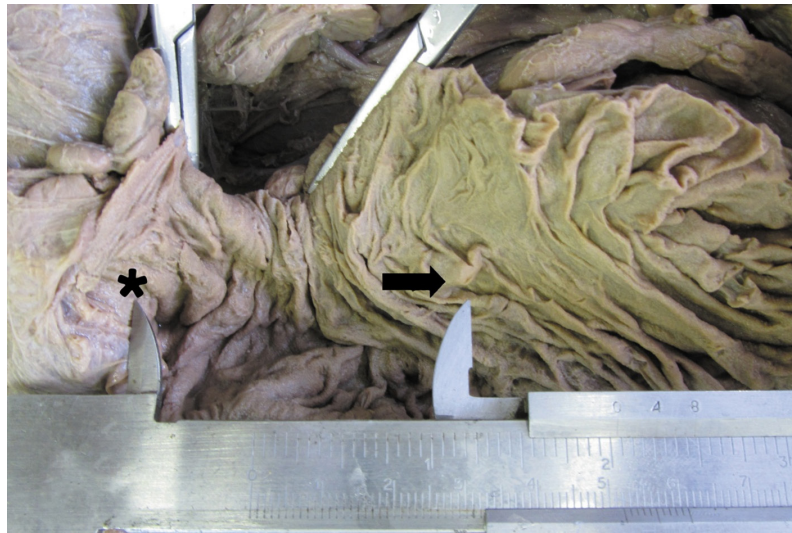


Figure 1. *Corpse 1:* major duodenal papilla (arrow) lying 5.2 cm distal to the pyloric ostium (*).



Figure 2. *Corpse 2:* major duodenal papilla (arrow) lying 6.7 cm distal to the pyloric ostium (*).

The papilla was 5.2 cm distant from the pyloric ostium, lying posteromedial at the beginning of the upper duodenal flexure. It presented a single opening, forming the Ampulla of Vater. This corpse does not have a minor duodenal papilla.

The corpse 2 also suffered prior formalinfixation. The papilla was 6.7 cm distant from the pyloric ostium, lying posteromedial at the end of the upper duodenal flexure, between the first and second duodenal portions. It presented a double opening with the formation of the Ampulla of Vater. This corpse does not have a minor duodenal papilla either.

Figure 3 is a schematic drawing of the duodenum and the usual site of the papilla of Vater as well as the variations found in this study.

3 Discussion

The major duodenal papilla is very important in digestion as it represents the confluence of the bile duct and Wirsung

duct in the intestinal lumen, which lead, respectively, bile and pancreatic juice.

Retroduodenal surgeries procedures need to be carefully done to avoid damaging or injuring any organs at this region. This observation is especially important for surgeons in cases that the biliary tree or the main pancreatic duct is blocked by a stone or tumor and its distal portion cannot be filled with dye, invalidating the application of the endoscopic retrograde cholangiopancreatography (ERCP) and requiring complementary imaging studies to identify the correct position of the Wirsung and choledochal duct (LINDNER, PENA and RUGGERI, 1976; MONTEIRO and SANTANA, 2006).

In an analysis of 194 dissections, Lurje (1937) found 16 (8.25%) of variation of the papilla, localized in the horizontal portion (LURJE, 1937). Dowdy Junior, Waldron and Brown (1962) performed a study in a 100 autopsies, finding that eight (8%) had anomalous located major duodenal

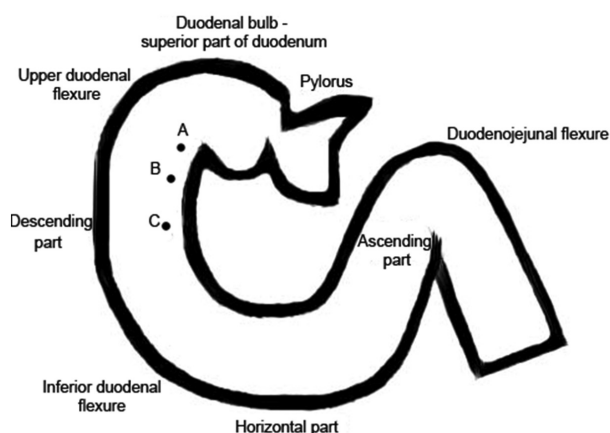


Figure 3. Schematic drawing of the duodenum. A: site of the major duodenal papilla found in corpse 1; B: site of the major duodenal papilla found in corpse 2; C: usual site of the papilla.

papilla, only four of them in the duodenal bulb (DOWDY JUNIOR, WALDRON and BROWN, 1962). Lindner, Pena and Ruggeri (1976), which observed the papilla in operative cholangiograms of 1000 patients, found that 17.9% of subjects had anatomical variation in insertion of the major duodenal papilla. However, he did not describe variations of the insertion of the papilla in the upper portion of the duodenum or in the upper flexure of this structure, neither in the ascending portion or extraduodenal loci (LINDNER, PENA and RUGGERI, 1976). Disibeyaz, Parlak, Cicek et al. (2007), which performed a study by collecting data from 12.158 cholangiographies found 53 (0.43%) cases of ectopic papilla in the duodenal bulb (DISIBEYAZ, PARLAK, CICEK et al., 2007).

In the present study the corpses had the structure located near the upper duodenal flexure, thus could be assigned as an uncommon variation, as it is proximal to the normal anatomic site. This anatomic variation could be explained by a upper formation of the pancreatic buds during the fifth to the eighth weeks of the embryological development (MOORE, 1986) or by an early subdivision of the pars hepatica and pars cystica in the hepatic embryogenesis near the fourth week of development, leading to the upper opening of the common bile duct as the pars hepatica will then be above the zone of growth between the stomach and the duodenum (BOYDEN, 1944; MOORE, 1986).

The anatomical variations presented in this study and the ones concerning the same subject are of clinical and surgical importance, as it can lead to abdominal symptoms such as pain and be associated with cholangitis or pancreatitis due to the anomalous path and angles of the ducts (DISIBEYAZ, PARLAK, CICEK et al., 2007; KUBOTA, FUJIOKA, HONDA et al., 1988) which could also lead to injuries to retroduodenal structures in the approach of the major duodena papilla for ERCP performance. It has also a surgical importance as this structure can suffer unintended

damage in the operative manipulation of this region, such as in the case of a duodenal peptic ulcer bleeding or in a gastrectomy (KUBOTA, FUJIOKA, HONDA et al., 1988). Therefore, knowledge of anatomical variations presented here suggests clinical and surgical importance, including due to retroduodenal anatomical structures care that could inadvertently be injured in a surgical approach to the major duodenal papilla, increasing morbidity and mortality from these procedures.

Acknowledgements: We wish to acknowledge the assistance of the academic community of the Federal University of Ouro Preto, Minas Gerais State, Brazil, which let us use the corpses to study and provided the structure to research in the existing bibliography.

References

- BOYDEN, EA. Congenital variations of the extrahepatic biliary tract: a review. *Minnesota Medicine*, 1944, vol. 27, p. 932-933.
- DISIBEYAZ, S., PARLAK, E., CICEK, B., CENGİZ, C., KURAN, SO., OGUZ, D., GÜZEL, H. and SAHIN, B. Anomalous opening of the common bile duct into the duodenal bulb: endoscopic treatment. *BMC Gastroenterology*, 2007, vol. 7, p. 26. PMID:17610747 PMCID:PMC1933541. <http://dx.doi.org/10.1186/1471-230X-7-26>
- DOWDY JUNIOR, GS., WALDRON, GW. and BROWN, WG. Surgical anatomy of the pancreatico-biliary ductal system-observations. *Archives of Surgery*, 1962, vol. 84, p. 229. PMID:13887616. <http://dx.doi.org/10.1001/archsurg.1962.01300200077006>
- HORIGUCHI, S. and KAMISAWA, T. Major duodenal papilla and its normal anatomy. *Digestive Surgery*, 2010, vol. 27, n. 2, p. 90-93. PMID:20551649. <http://dx.doi.org/10.1159/000288841>
- KUBOTA, T., FUJIOKA, T., HONDA, S., SUETSUNA, J., MATSUNAGA, K., TERAOKA, H. and NASU, M. The papilla of Vater emptying into the duodenal bulb. Report of two cases. *Japanese Journal of Medicine*, 1988, vol. 27, p. 79-82. PMID:3367542. <http://dx.doi.org/10.2169/internalmedicine1962.27.79>
- LINDNER, HH., PENA, VA. and RUGGERI, RA. A clinical and anatomical study of anomalous terminations of the common bile duct into the duodenum. *Annals of Surgery*, 1976, vol. 184, n. 5, p. 626-632. PMID:984933 PMCID:PMC1345496. <http://dx.doi.org/10.1097/00000658-197611000-00017>
- LURJE, A. The topography of the extrahepatic biliary passages. *Annals of Surgery*, 1937, vol. 105, p.161. PMID:17856914 PMCID:PMC1390568. <http://dx.doi.org/10.1097/00000658-193702000-00001>
- MONTEIRO, ELC. and SANTANA, EM. *Técnica cirúrgica*. Rio de Janeiro: Guanabara Koogan, 2006. p. 1047-1064.
- MOORE, KL. *Embriologia Clínica*. 3rd ed. Rio de Janeiro: Guanabara Koogan, 1986. p. 216-223.
- TESTUT, L. and JACOB, O. *Compêndio de anatomia topográfica com aplicações médico-cirúrgicas*. Rio de Janeiro: Editorial Labor do Brasil S.A., 1947. p. 275-278.

Received May 15, 2013

Accepted November 15, 2013