HEPATIC ARTERY ANATOMIC VARIATION: IMPORTANCE OF PREOPERATIVE PLANNING

VARIANTE ANATÓMICA DA ARTÉRIA HEPÁTICA: IMPORTÂNCIA DO PLANEAMENTO PRÉ-OPERATÓRIO

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ABSTRACT

Anatomic variations of the hepatic artery are not uncommon and may lead to iatrogenic injuries during pancreatoduodenectomy (PD). Two classifications (Michels' and Hiatt's) have been used to describe the different variations. Ligation of an aberrant hepatic artery may result in life-threatening complications, such as liver necrosis. Preoperative imaging is crucial for detection of these variations.

Keywords: *aberrant hepatic artery, duodenopancreatectomy, anatomy, Michels, Hiatt.*

RESUMO

As variações anatómicas da artéria hepática não são incomuns e podem levar a lesões iatrogénicas durante a duodenopancreatectomia. Duas classificações (Michels´e Hiatt´s) têm sido usadas para descrever as diferentes variações conhecidas. A laqueação da artéria hepática aberrante pode resultar em complicações graves, como necrose hepática. O estudo cuidado das imagens pré-operatórias é crucial para a deteção destas variações.

Palavras-chave: *artéria hepática aberrante, duodenopancreatectomia, anatomia, Michels, Hiatt.*

BACKGROUND

Normal hepatic anatomy is observed in approximately 55-75% of cases; up to 45% of patients present multiple anatomic variations. Usually, the common hepatic artery arises from the celiac axis, running rightwards and horizontally along the upper border of the pancreas to the pylorus. The common hepatic artery (CHA) lies anterior to the main portal vein and branches into the gastroduodenal artery (GDA) and the proper hepatic artery (PHA). The PHA divides into left and right hepatic arterial branches. Two classifications (Michels' and Hiatt's) have been used for describing the different variations.

Michels' classification of hepatic arterial anatomy

Type	Description	Percent
1	Normal	55
2	Replaced LHA from LGA	10
3	Replaced RHA from SMA	11
4	Replaced RHA and LHA	1
5	Accessory LHA	8
6	Accessory RHA	7
	Accessory RHA and LHA	1
8	Replaced RHA and accessory LHA or replaced LHA ans accessory RHA	4
9	CHA from SMA	2,5
10	CHA from LGA	0

Hiatt's classification of hepatic arterial anatomy

Type	Description	Percent
1	Normal	75,7
2	Replaced or accessory LHA	9,7
3	Replaced or accessory RHA	10,6
4	Replaced or accessory RHA and replaced or accessory LHA	2,3
5	CHA from SMA	1,5
6	CHA from aorta	0,2

In approximately 2,5% of patients, the common hepatic artery originates from the superior mesenteric artery (SMA). When this occurs, the hepatic artery typically runs cephalad or through the uncinate process. Inadvertent ligation of an aberrant hepatic artery may result in unforeseen complications, such as liver necrosis and ischemic biliary injury with breakdown of the bilioenteric anastomosis.

CASE REPORT

We report the case of a 60-year-old female patient with cephalic pancreatic adenocarcinoma proposed for pancreatoduodenectomy after neoadjuvant chemotherapy with FOLFIRINOX. The patient was previously submitted to endoscopic biliary drainage due to obstructive jaundice. A preoperative contrast CT scan was performed showing partial tumor response, with close contact with the hepatic artery without encasement (<180º). Interestingly, an anatomic variation of the hepatic artery originating from the superior mesenteric artery was found (figure 1).

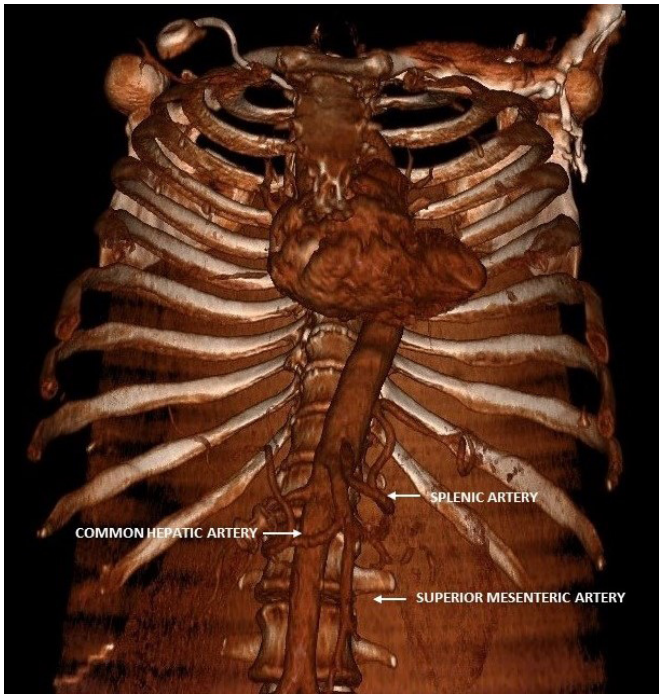

Figure 1 – **Angio-CT**

A pancreatoduodenectomy was performed with identification of pancreas divisum with the hepatic artery originating from the superior mesenteric artery and crossing posterior to the head of the pancreas (figure 2).

The surgery was performed with no iatrogenic injuries and was uneventful. The postoperative period was complicated with an intra-abdominal abscess treated with percutaneous drainage and the use of an antifungal agent for *Candida Albicans* and antibiotherapy for *E. Coli*. Pathologic specimen analysis showed a complete tumor response (ypT0) with no lymph node involvement (0/28, ypN0). Surgical margins without microscopic tumor (R0).

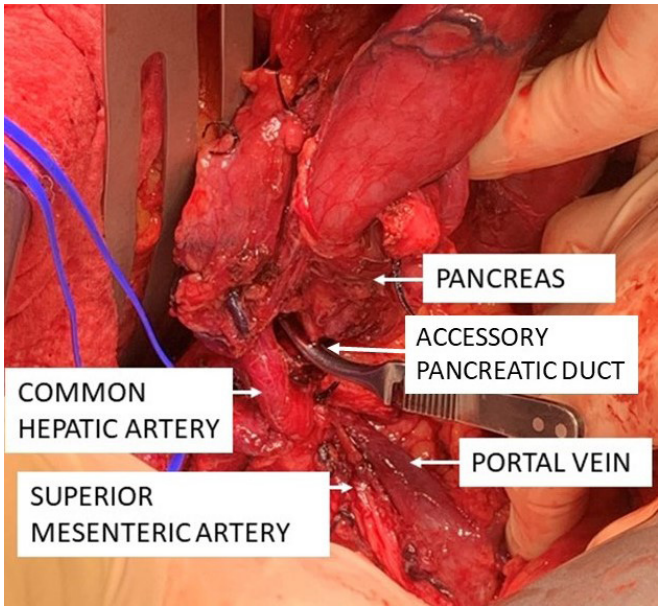

Figure 2 – **Surgical anatomy**

CONCLUSION

Aberrant hepatic artery originating from the SMA is one of the rarest known variations. Identification of arterial variations in preoperative imaging allows proper planning and appropriate operative management in order to avoid arterial injury. Although being technically demanding, dissection of the vessels far from the pancreas is usually possible without compromising the radicality of resection and should be attempted. Surgeons must be aware of these variations and preoperative imaging should be studied thoroughly prior to surgery in order to prevent this possibly fatal iatrogenic injury.

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