

The accessory bile duct and the duct of Luschka

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ABSTRACT

Variations of the bile ducts system are well described in the literature. The duct of Luschka is characterized as an accessory bile duct that drains the V hepatic segment. Despite that, there are different definitions reported in the literature, which causes confusion for surgeons and anatomists. Accessory bile ducts are significant as it can drain the liver parenchyma directly. Furthermore, they can be injured during hepatobiliary surgeries, with special mention to cholecystectomies. Due to the increase in rates of gallbladder removal, it is worth mentioning and studying this anatomical variation and it is necessary to elucidate its actual nomenclature. Even though eponyms are falling into desuse in its anatomical sense, they abundantly used in surgery and clinical classes. We aim to report the presence of an accessory bile duct and discuss its surgical implications and its eponym.

Keywords: *anatomical variations, gallbladder, hepatic duct, liver, surgery*

INTRODUCTION

The union of many intrahepatic bile ducts forms two major ducts: the left hepatic and right hepatic ducts, which are responsible for draining the hepatic parenchyma [1, 2].

The right and left hepatic ducts fuse in order to form the common hepatic duct (CHD). The latter perpendicularly crosses the right hepatic artery and a branch from the portal vein. The cystic duct (CD) leaves the gallbladder and joins the CHD and forms the common bile duct (CBD) [1, 2].

Variations of this regular anatomy are known in the literature, although they should not be overlooked and forgotten, as they possess clinical and surgical interest, in particular to the general surgeon, interventional radiologists and gastroenterologists [1-6].

Duct of Luschka (DL) is characterized as an accessory bile duct (ABD) that leaves the leaves the liver (usually the segment V) and joins the right hepatic duct or the CHD, although there is debate whether this eponymous nomenclature is precise and correct [6-8]. There is also debate regarding the

definition and the incidence of this variation, as it can range from 1% to 50% [1, 3, 5-7, 9].

We report a case of an ABD in a male cadaver and discuss its surgical implications as well as the nomenclature of DL.

CASE REPORT

A male cadaver fixated with a 10% formalin solution was dissected during regular anatomy lessons of the Gama Filho University's Anatomy laboratory. As the hepatic hilum was dissected, it was observed an unusual display of the biliary ducts system. There was an ABD originating from the fifth liver segment which joined the confluence of the CHD and CD in order to form the CBD (Figure 1). This ABD was located posterior to the cystic artery and had a caliber of 0.2 mm.

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Duct of Luschka revisited

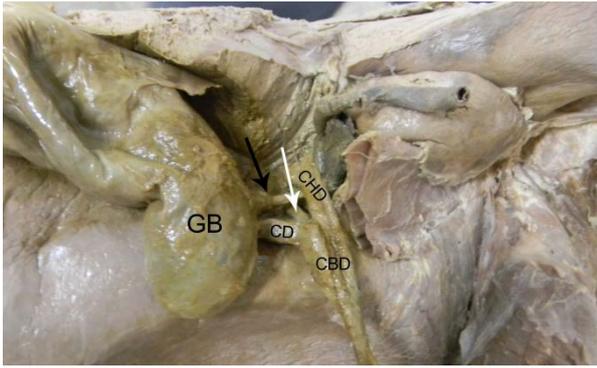


Figure 1: Visceral view of the liver. The accessory bile duct can be seen (white arrow), as well as the Gallbladder (GB), common hepatic duct (CHD), cystic duct (CD), cystic artery (black arrow) and the common bile duct (CBD).

DISCUSSION

An embryological basis is needed in order to understand the variations of the biliary ducts. The development of the liver and its ducts starts on the fourth week of ontogenesis, as on the day 22th a small endodermal thickening is formed on the ventral side of the duodenum: the hepatic plate, which proliferates and forms the hepatic diverticulum [4, 6, 9, 10].

The hepatic diverticulum gives origin to the hepatoblasts, then, under the influence of protein signals, these cells originate the liver tissue and the hepatic ducts (as well as the extrahepatic portion of the right and left hepatic ducts [4, 6, 9, 10].

Around the 26th day, another diverticulum is formed through a distinct endodermal thickening: the cystic diverticulum, which forms the gallbladder and the cystic duct. It is important to recall the fact that the gallbladder is intrahepatic until the seventeenth week of development, and it is elongated and tubular in shape until the eleventh week of gestation [4, 6, 9, 10].

Variations of the bile system involves agenesis, doubled, tripled, intrahepatic, ectopic, septated and changes in the shape of the gallbladder. The CD may be absent, doubled, tortuous, ectopic termination and may differ in length, diameter and internal morphology. Variations of the hepatic ducts usually involves the ectopic termination, absence of one of the main ducts, the presence of supernumerary ducts, and the presence of a hepaticocystic duct [1-4, 6, 8, 9].

Thus, as previously stated, these variations often have an embryological basis and shall be explained no further in this paper.

The definition of DL is not a consensus within the literature [5, 7]. Some authors define this term as any duct along the gallbladder fossa between the gallbladder and the liver parenchyma [5, 9], other authors define it as a small bile duct from segment V of the liver that traverses the gallbladder fossa and joins the CHD" [6, 8], or as a duct (or a network of ductules) that typically originates on the right hepatic lobe and run an intermediate course along the gallbladder bed, usually reaching the adventitia of the gallbladder [11, 12]. Other authors state that the DL does not drain any liver parenchyma, as it possess a blind distal end [1, 7, 11].

The seemingly endless definitions of DL is a concern to surgeons, as the surgical treatment for an injured bile duct which drains a portion of liver parenchyma is different from a duct that possess a blind end. It is also cause of concern to anatomists, due to numerous definitions of a single structure labeled as "Luschka's duct" [7, 13, 14].

According to the literature, Luschka described those accessory ducts as "slender bile ducts running along the gallbladder fossa, draining into the right hepatic duct or common duct" [12], although this contradicts a paper published in 2014, where the authors performed a historical and bibliographical analysis of Luschka's books and did not found any mention whatsoever of both definitions of what is today known as DL [7]. Furthermore, Luschka only described what are known today as peribiliary glands in the intra- and extrahepatic bile ducts and gallbladder wall which could have been misinterpreted as a duct [7].

Thus, we believe that the presence of supernumerary ducts - such as the one presented in this report - should not be labeled as DL nor aberrant ducts. They must be named for what they really are: ABD. Ducts that connect the gallbladder and the liver parenchyma should be labeled subvesical accessory bile ducts, in accordance with Schnelldorfer et al. (2012) [5].

Nomenclature confusion causes impact on studies that describe the incidence of ABD. This is

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indeed evident, as there are rates of DL that ranges from 1% to 50% [1, 5, 6, 11, 12].

Another cause of confusion is the existence of a cholecystohepatic duct, which is an intrahepatic bile duct that directly drains the liver into the gallbladder, which possess lower incidence rates than ABD [1, 6].

Cholecystectomies are among the most performed surgical procedures. Variations of the bile duct system can account for leakage during and after cholecystectomies if not promptly identified [5, 6, 14, 15].

Injuries to ABD are the second most frequent complication after cholecystectomy, and usually occur after ligation and division of the cystic artery and cystic duct, as well as during dissection of the gallbladder from its fossa [9, 12]. Post operative bile leakage can cause peritonitis, abscess, mild abdominal pain, fever, although the clinical manifestations are dependant on the quantity of leaked bile [3, 12].

Bile drainage and ligation of the supernumerary duct is the usual treatment, although hepatojejunostomy has been performed in cases where standard treatment fails and reoperation or endoscopic placement of a bile duct stent can be used in cases of severe bile leakage [12, 14].

CONCLUSIONS

Variations of the bile ducts are clinically significant in respect to cholecystectomies and radiological exams. The one reported here is of particular interest, as it possess divergences in nomenclature which causes confusion among surgeons and anatomists. This leads to failure of obtaining the real incidence and a concise definition of this anatomical variation. The eponym "Duct of Luschka" seems to be unaccurate and imprecise, and it is one of the causes of confusion, thus, it should be avoided.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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RESUMO

O ducto hepático acessório e o ducto de Luschka

Variações nos ductos das vias biliares foram bastante descritas na literatura. O ducto de Luschka é conhecido como o ducto hepático acessório que drena o quinto segmento hepático. Porém, existem divergências a respeito deste epônimo, o que gera confusão entre anatomistas e cirurgiões. Os ductos hepáticos acessórios possuem significado clínico e cirúrgico, pois drenam o parênquima hepático separadamente. Além disso, podem ser lesionados em cirurgias hepatobiliares, como por exemplo, a colecistectomia. Devido ao aumento no número destes procedimentos, é válido ressaltar e reiterar o significado cirúrgico desta variação anatômica, assim como nomenclatura. Apesar do fato dos eponimos estarem entrando em desuso, estes ainda são bastante utilizados na área cirúrgica. O objetivo deste presente trabalho é relatar a presença de um ducto hepático acessório e discutir suas implicações cirúrgicas e o epônimo desta variante.

Palavras-chave: variações anatômicas, vesícula biliar, ducto hepático, fígado, cirurgia