EXTRAHEPATIC BILIARY SYSTEM AND THE CYSTOHEPATIC TRIANGLE: ANATOMOTOPOGRAPHIC STUDY

VIAS BILIARES EXTRA-HEPÁTICAS E TRÍGONO CISTOHEPÁTICO: ESTUDO ANATOMOTOPOGRÁFICO

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ABSTRACT

Introduction: The cystohepatic triangle (Calot's triangle) is an anatomical space bounded by the common hepatic duct, the cystic duct (CD), and the inferior border of the liver. This anatomical landmark is crucial for performing cholecystectomy. **Case report:** The abdominal region of a male cadaver was dissected, followed by a dissection of the hepatic pedicle to isolate the studied structures. The hepatocytic junction occurred at 2.6 cm from the hepatic hilum, and the CD junction joined the hepatic duct on its right side. Regarding the structures within the cystohepatic triangle, the space was occupied posteriorly by the portal vein and anteriorly by the cystic artery and right hepatic artery. **Comments:** Detailed knowledge of the topographic anatomy of the abdomen, specifically of the extrahepatic biliary tract and its anatomical variations, is essential to avoid complications in video laparoscopic surgery.

Keywords: Anatomy; bile ducts; cholecystectomy; anatomic variation; cadaver

RESUMO

Introdução: O trígono cistepático (triângulo de Calot) é um espaço anatômico delimitado pelo ducto hepático comum, o ducto cístico e a borda inferior do fígado. A importância desse marco anatômico é indiscutível para a realização da colecistectomia. R**elato do caso:** Foi realizada a dissecação da região abdominal de um cadáver do sexo masculino, seguida pela dissecação do pedículo hepático para individualização das estruturas estudadas. Observou-se que a junção hepatocística se deu a uma distância de 2,6 cm em relação ao hilo hepático, bem como a junção do ducto cístico se fez à direita do ducto hepático. Em relação às estruturas encontradas no trígono cisto hepático, observou-se que este era ocupado pela veia porta-hepática posteriormente e pela artéria cística e artéria hepática direita anteriormente. **Comentários:** Na cirurgia videolaparoscópica é imprescindível o conhecimento detalhado da anatomia topográfica do abdômen, em específico, das vias biliares extra-hepáticas, bem como suas variações anatômicas para evitar complicações durante o procedimento cirúrgico.

Palavras-chave: Anatomia; Ductos Biliares; Colecistectomia; Variação Anatômica; Cadáver

INTRODUCTION

In laparoscopic surgery, detailed knowledge of the topographic anatomy of the abdomen, particularly of the extrahepatic biliary tract and its anatomic variations, is essential to prevent complications during the surgery[1].

The cystohepatic triangle (Calot's triangle) is an anatomical space bounded by the common hepatic duct (CHD), the cystic duct (CD), and the inferior border of the liver. This anatomical landmark is crucial for performing cholecystectomy, which involves ligation of the cystic artery and CD prior to gallbladder removal[1],[2].

Therefore, this study aimed to describe the anatomical characteristics of the cystohepatic triangle in human cadavers, emphasizing its importance for surgical practice.

CASE REPORT

This study was conducted at the Department of Anatomy of the Federal University of Pernambuco. A male cadaver fixed in 10% formalin was dissected in the abdominal region, followed by a dissection of the hepatic pedicle to isolate the studied structures.

For morphometric analysis, a digital caliper was used to measure the length of the common bile duct (CBD), CD, and the distance from the hepatocystic junction to the hepatic hilum (Figure 1). The hepatocystic junction was distanced 2.6 cm from the hepatic hilum, with the CD joining the common hepatic duct (CHD) on its right side (Figure 1). No accessory ducts were observed.

Regarding the structures found in the cystohepatic triangle, the triangle was positioned anteriorly by the cystic artery and right hepatic artery (Figure 2), and posteriorly by the portal vein. The CBD and CD lengths were 2.6 cm and 1.0 cm, respectively (Figure 1).

The CD exhibited a straight anatomical course. The gallbladder was in the anteroinferior portion of the liver, featuring a distinct infundibulum (Hartmann's pouch).

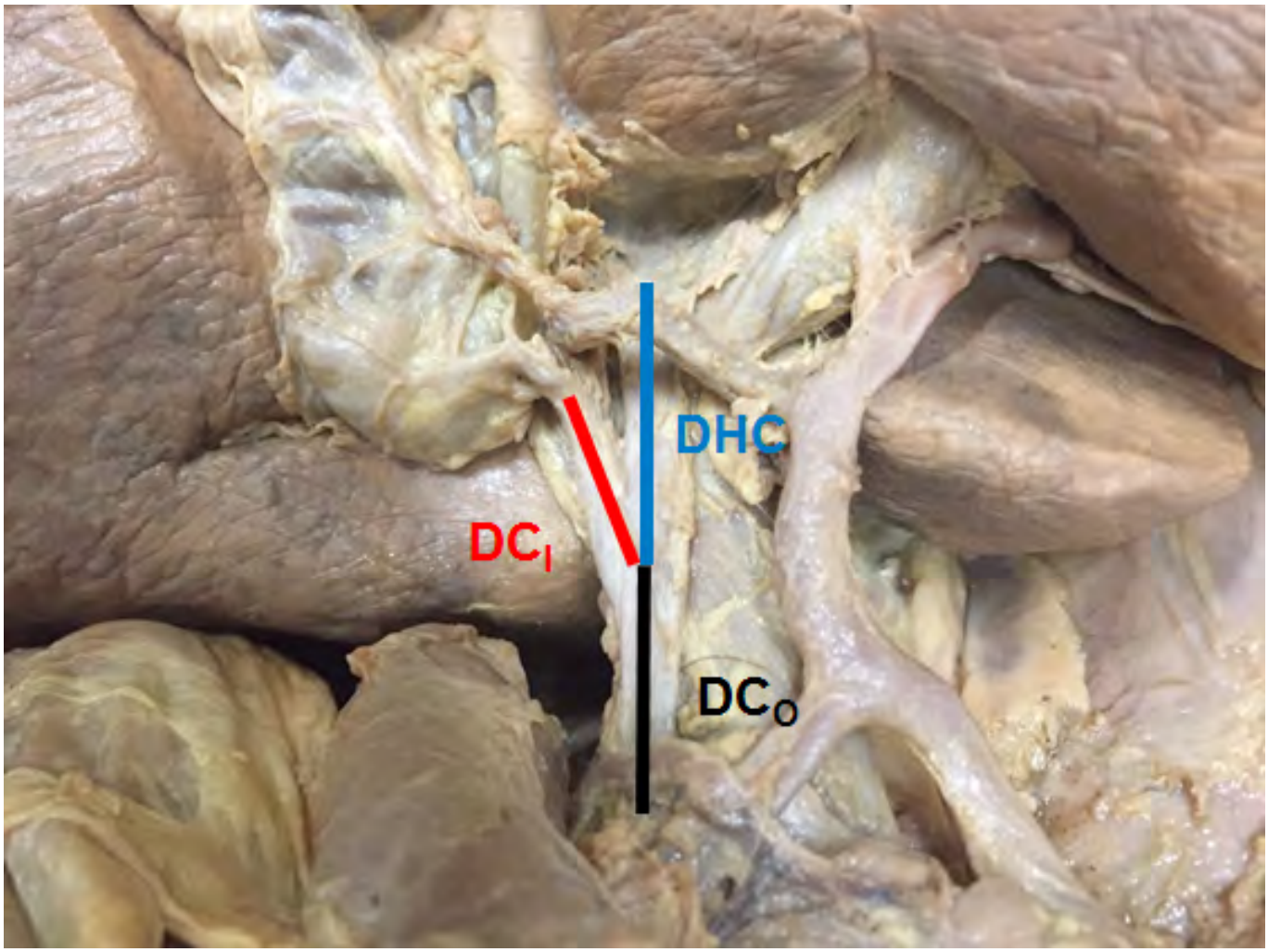

Figure 1. Measurements of the cystohepatic triangle (Calot's triangle). Cystic duct (CD): 1.0 cm (straight), common bile duct (CBD): 2.6 cm, and common hepatic duct (CHD): 2.6 cm.

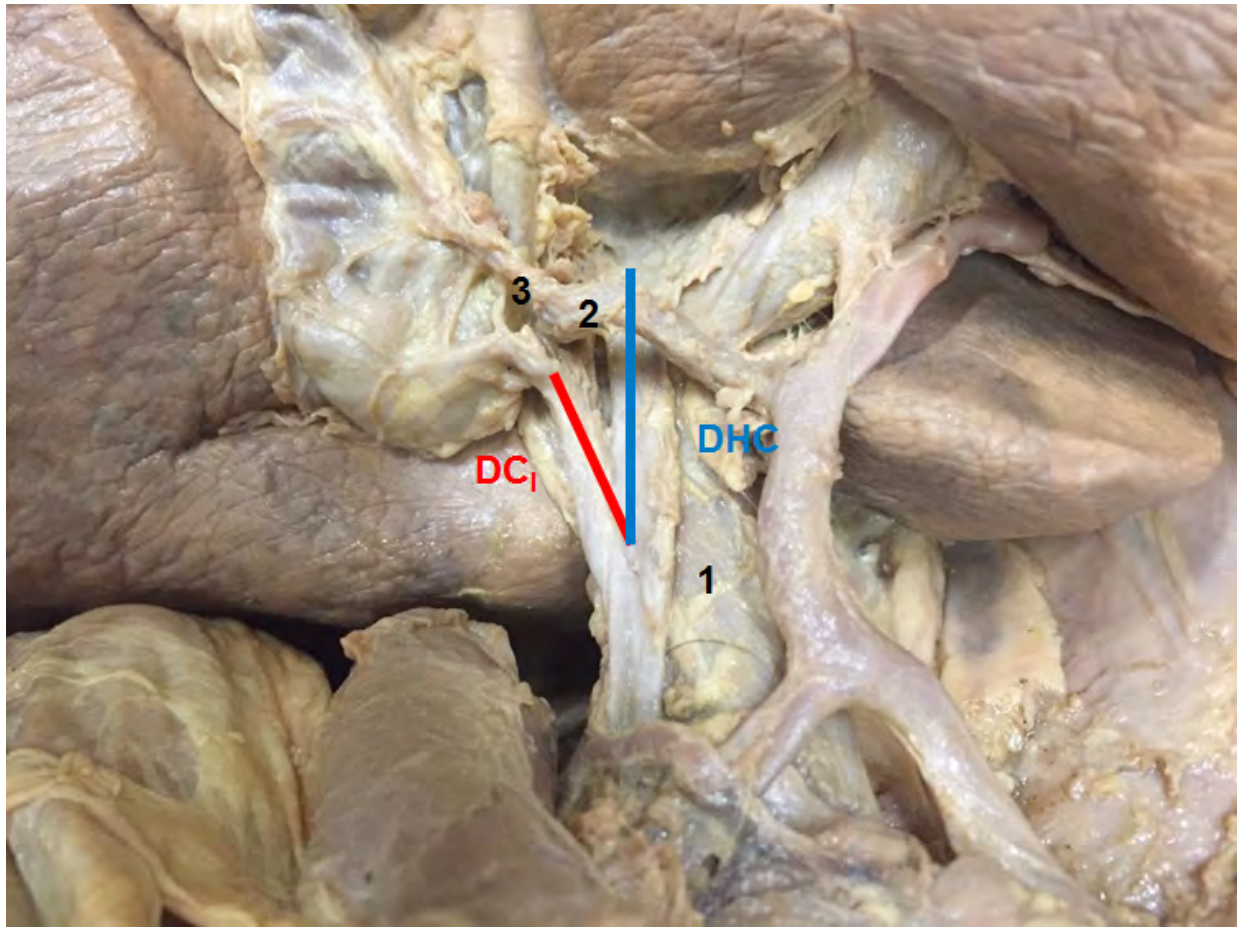

Figure 2. Contents of the cystohepatic triangle (Calot's triangle). Portal vein (1), right hepatic artery (2), and cystic artery (3). Cystic duct (CD), common hepatic duct (CHD).

COMMENTARIES

The hepatocystic junction was positioned 2.6 cm from the hepatic hilum, with the CD joining the CHD on its right side. This finding corroborates an anatomical study in which the junction of the CHD and CD occurred about 2.92 cm from the hepatic hilum in 94% of cases[1].

Evidence suggests that the hepatocystic junction may cause bile stasis and its reflux to the pancreas when positioned too low[3]. This position may also cause lithiasis formation, Mirizzi syndrome, and gallbladder cancer[1].

Several studies reported that the union of the CD with the CBD occurs most frequently on its right side[1,4], as observed in the present study. Other research has reported that this union may also occur posteriorly[3,5] or in both anterior and posterior positions[1].

The CBD and CD lengths were 2.6 cm and 1.0 cm, respectively. While the CD length found was shorter than those reported in the literature[1], evidence suggests that longer CD length correlates with lithiasis formation[3,6,7].

One cause of bile duct injuries is related to the junction of the CD with the CHD, in which the CBD may be mistaken for a wide CD, leading to a CBD injury[8].

In the present study, the CD exhibited a straight morphological course. This finding aligns with a study that found that 54% of samples presented straight morphology, while 46% showed a spiral configuration[1]. Anatomical variations, such as aberrant CD and bile ducts emerging directly from the right hepatic lobe to the gallbladder, may lead to postoperative complications and have been described as responsible for bile leakage after cholecystectomy[8].

In this study, the gallbladder was in the anteroinferior portion of the liver, corroborating previous findings reporting this position in 52% of cases[1]. However, other studies described the gallbladder fundus in the posteroinferior liver region[9] or on the left side[10]. Additional anatomical variants include congenital absence of the gallbladder and CD[11] and double gallbladder[12].

In cases of double gallbladder, diagnosis should be established during surgery to avoid injury to the main bile duct, requiring intraoperative cholangiography to verify main bile duct integrity. The gallbladder examination after surgery is crucial for definitive diagnosis[13].

Gallbladder perforation occurs in 20% to 30% of cholecystectomies, with bile and stone spillage. In some cases, unrecovered stones may remain in the abdominal cavity, potentially causing granulomas, intestinal obstruction, or stone migration to other regions[14].

Regarding the most prevalent structures in the cystohepatic triangle, studies1,15 reported the cystic artery and common hepatic artery with frequencies of 56% to 90% and 34% to 82%, respectively; the portal vein was described in 36% of cases[1]. Failure to identify these structures may cause serious injuries during laparoscopic surgeries[8].

A study investigating the main complications of laparoscopic gallbladder and extrahepatic bile duct surgery categorized the principal causes of these complications into two groups: first, the inexperience of surgeons with the technique (learning curve), and second, anatomical variations that even experienced surgeons may encounter[8].

The topography of the extrahepatic biliary tract demonstrated significant anatomical variations. Thus, surgeons must possess a thorough knowledge of this region to minimize iatrogenic injuries.

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