Abstract

Introduction

Though vascular variations of gallbladder and liver are well documented in the literature, the knowledge of incidence of rare vascular variations related to them is clinically important while planning the open and endovascular procedures involving these organs. This study reports a case of variant origin of a common trunk of the accessory hepatic artery and cystic artery from the superior mesenteric artery.

Case report

During the cadaveric dissection, we came across a rare vascular variation in the supracolic compartment of the abdomen. A common trunk of accessory hepatic artery and cystic artery arose from the right margin of the superior mesenteric artery. It coursed upwards behind the head of the pancreas and first part of the duodenum and entered into the right free margin of the lesser omentum. It finally entered into the substance of the right lobe of the liver. Before entering into the liver, it gave a branch at the level of the Calot’s triangle. After reaching the surface of the neck of the gallbladder, it divides into superfi
cial and deep branches.

Occasionally, CA may also arise from the hepatic artery proper, left hepatic artery, right gastric artery, superior pancreaticoduodenal artery, superior mesenteric artery (SMA), coeliac artery or gastroduodenal artery. It frequently shows variations in its course in the Calot’s triangle. It reaches the gallbladder by passing in front or behind the bile duct or the common hepatic duct. Various studies have documented the incidence of variant origin and course of the CA.

The knowledge of possible anatomical variations of vascular pattern of gallbladder and liver is essentially important during surgical and radiological interventions. Here we report a rare case of origin of common trunk of accessory hepatic artery (AHA) and CA from the SMA.

Conclusion

The variant origin of the common trunk of accessory hepatic artery and cystic artery, along with its unusual course in relation to the Calot’s triangle is clinically important during laparoscopic and open cholecystectomy procedures.

Discussion

The vascular pattern of the liver is highly variable. One or more branches of the hepatic artery may arise from neighbouring vessels other than the proper hepatic artery. Frequently, such branches are defined as aberrant vessels. These aberrant hepatic arteries are classified into two types, replacing and accessory. The aberrant artery supplying the liver in the presence of a normal hepatic artery is named as AHA. An aberrant artery which is supplying the liver as a sub-
stitute of the normal hepatic artery is termed as replacing hepatic artery.

Various authors have described the origin, occurrence and importance of accessory and replaced hepatic arteries in the literature. In a study by Dutta et al., presence of AHA has
been observed in 5% of the cases. In their study no replaced hepatic artery was observed. AHA may arise from the SMA. Previously, incidence of such origin has been reported. Frequently, AHA was seen in the fissure for ligamentum venosum. Rarely it was observed to course through the porta hepatis. The origin of the left inferior phrenic artery from AHA which was supplying the upper part of the left suprarenal gland has been reported. AHA reported in this case is unique because of its common origin along with the CA from the SMA. Contrary to previous reports, AHA entered the quadrate lobe liver directly. Awareness of variant vascular anatomy of the liver is clinically important during preoperative arterial imaging and also while planning open and endovascular procedures. Otherwise these variations may lead to inadvertent injury during open surgical procedures involving liver and sub-hepatic regions. CA shows frequent variations in its origin and there are reports in the literature on such variations. Anson has reported the incidence of origin of CA from the right hepatic (63 ± 9%), hepatic trunk (26 ± 9%), left hepatic (5 ± 5%), gastroduodenal (2 ± 6%), superior pancreaticoduodenal (0 ± 3%), right gastric (0 ± 1%), coeliac trunk (0 ± 3%) and SMAs (0 ± 8%). In a study by Harris and Pellegrini, CA took origin from the right hepatic (75%), left hepatic (6 ± 2%), hepatic trunk (2 ± 2%), common hepatic (0 ± 6%), coeliac trunk (0 ± 3%), superior pancreaticoduodenal (0 ± 2%) and the SMAs. The origin of CA from the SMA is not common. In multidetector CT angiographic study, CA was found to arise from the SMA in 0.5% cases. In this case, we report a rare variation of origin of common trunk of AHA and CA from the SMA. During laparoscopic and open cholecystectomy procedures, the anatomical relation of CA with cystic duct in the Calot’s triangle is important. In laparoscopic procedures CA is considered superficial or anterior to cystic duct; in open cholecystectomy procedure, it is localised inferior to the cystic duct. In this case, the common trunk of AHA and CA passed behind the cystic duct and formed the content of Calot’s triangle, the knowledge of these kinds of variations are clinically important during laparoscopic and open cholecystectomy procedures.

Unusual origin of common trunk of AHA and CA may be attributed to the errors in the complex developmental stages of vascular pattern. In an intrauterine period, hepatocystic bud arises from the junction of the foregut and midgut. This bud receives the rich supply of vessels from the direct branches of aorta, coeliac trunk and the SMA. Successively, some of these vessels will persist and others will be absorbed, resulting in the mature vascular pattern to the extra-biliary apparatus. Any errors in this complex process results in unusual vascular pattern as observed in this case.

Conclusion
The unusual course of common trunk of AHA and CA in the hepatoduodenal ligament of lesser omentum may predispose it to unexpected bleeding or injuries during the surgical approach of Calot’s triangle. It also may cause difficulty while releasing the internal hernia from the lesser sac, as it forms the unusual content of the ligament. The knowledge of the anatomical variations of the arterial supply of the gallbladder and liver is of great importance in hepatobiliary surgical procedures.

References
3. Bergman RA, Afifi AK, Miyauchi M. Virtual hospital: a digital library of health...
Case report