At operation, after opening the abdomen by right subcostal incision open cholecystectomy.

The gall bladder after giving off the cystic artery branch. The right hepatic artery(RHA) was seen to travel deep to gall bladder fossa in extra-hepatic course. After ligation and division of the cystic artery and duct together by silk gall bladder was dissected off liver bed very cautiously to avoid injury to extra-hepatic RHA. After removal of whole gall bladder from liver bed it was seen that RHA travel a longextra-hepatic course through gall bladder fossa before entering into liver near fundus of gall bladder. The right hepatic duct (RHD) was seen to travel an unusually long extra-hepatic course along the upper margin of the gall bladder fossa before entering into the liver near the fundus.

Intra-operative picture was given showing the unusually long extra-hepatic course of RHA starting near red arrow and entering liver as shown by green arrow. Black arrow indicates the cut end of cystic artery and cystic duct. The blue arrow indicates the position of common hepatic duct (CHD). The yellow arrow indicates the right hepatic duct (RHD) arising from CHD. A small area of yellowish tinge over RHD indicates the punctured site of needle.
The normal vascular pattern of liver, biliary system and pancreas was seen in only 60% of population. The origin and course of both RHA, cystic artery RHD has several documented anomalies. These variations are very much important to the surgeons to prevent iatrogenic injury to RHA or RHD. The RHA usually arises from hepatic artery proper after giving off the right gastric and gastro-duodenal branch. RHA usually passes behind the common hepatic duct and enters the cystic triangle of Calot. But in some cases it passes in front of the bile duct making it vulnerable to injury during dissection. [1] After giving off the cystic artery branch RHA enters the liver shortly with very small extra-hepatic course. But in rare cases as shown in above picture it travel a very long course in gall bladder fossa before entering into the liver near fundus of gall bladder making it vulnerable to injury during dissection of gall bladder from liver bed. The confluence of right and left hepatic ducts takes place at the right of hilar fissure of the liver anterior to portal venous bifurcation and overlying the origin of the right branch of portal vein. The extra-hepatic segment of the right duct is short but the left duct has a much longer extra-hepatic course. [1]

The course of the RHA is anterior to the bile duct in 64% of cases, anterior to portal vein in 0.1% of cases and posterior to portal vein in 9% of cases. In 10%, the RHA runs parallal and in close proximity, to the cystic duct & neck of the gall bladder throughout its course. At the level of the neck of the gall bladder it enters the right lobe of the liver. [3] 14.8% had variant right hepatic arteries (RHAs), 4.7% patients had a variant anatomy involving both the LHA and the RHA, 4.0% patients had a variant origin of the common hepatic artery (CHA) arising from either the superior mesenteric artery (SMA) or the aorta. [6]

Uncontrollable hemorrhage during laparoscopic cholecystectomy occurs in 0.1% to 1.9% of all cases, with 88% originating from the gallbladder bed. The anatomical proximity between major branches of the middle hepatic vein and the gallbladder bed, and hence the risk of intraoperative bleeding. [11] Large branches (mean diameter = 2.1 mm) of the middle hepatic vein are directly adjacent to the gallbladder bed in 10% of patients. An additional 10% of cases also possess branches within 1 mm of the gallbladder bed. Twenty percent of all cases will display a large branch of the middle hepatic vein adherent or immediately adjacent to the gallbladder fossa. These patients are at increased risk for intraoperative bleeding. Furthermore, contracted gallbladders with evidence of chronic disease may be at increased risk for significant hemorrhage due to altered anatomy. [11]

Conversion to OC due to intraoperative hemorrhage occurred in 14 patients (0.27%). The hemorrhage was due to tangential side lesions of the cystic artery in 2 cases, the gallbladder bed in 11 cases, and the hepatic artery in 1 case. Conversion to OC caused by injury of the bile ducts occurred in 6 patients (0.12%). [13] Patients with large branches of the middle hepatic vein close to the gallbladder bed are at risk of hemorrhage during cholecystectomy and should be identified preoperatively with ultrasound. [12]

So always remain very careful during the dissection of liver bed by keeping in mind the variations of anatomy in gall bladder fossa.

The take home messages are -

1. don’t think operation was almost over after ligation and division of cystic pedicle , be careful till the end of operation.Unlikely it may be the starting of original and fundamental dissection in liver bed after an easy dissection in Calot’s triangle.

2. if junior residents are doing the dissection then monitor them carefully.

REFERENCES:

3. Ronald A. Bergman, phD, Adel K. Afifi, M.D., M.S., IysuukeMiyauchi, M.D.: Hepatic Artery
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