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CYSTIC ARTERY VARIATIONS IN LAPAROSCOPIC CHOLECYSTECTOMY

MUHAMMAD HUSSAIN[1], ADNAN BADAR[2], MANZOOR ALI[3], SHAHID ALAM[4], NAIK ZADA[5], ASADULLAH[6], INAYATULLAH KHAN[7]

1. Department of Surgery, Bacha Khan Medical College, Mardan.
2. Department of Anatomy, Bacha Khan Medical College, Mardan.
3. Department of Surgery, Saidu Medical College, Swat.
4. Department of Surgery, Saidu Medical College, Swat.
5. Department of Anatomy, Saidu Medical College, Swat.
6. Department of Anatomy, Saidu Medical College, Swat.
7. Department of Surgery, Saidu Medical College, Swat.

ABSTRACT

BACKGROUND: Lap cholecystectomy is gold standard for cholelithiasis. Earlier the incidence of morbidity and mortality was higher. Later on with the understanding of anatomy and fine techniques both morbidity and mortality decreased. Understanding of the anatomy of calot's triangle reduces the complications of the procedure.

OBJECTIVE: To study the pattern of variations in cystic artery and comparison with Caucasians.

MATERIAL AND METHODS: All laparoscopic cholecystectomies performed in Shah Medical Centre,over a period of 1 year from January 2013 to December 2013,in whom detailed anatomy of calot's triangle was clearly displayed were included in the study. Those laparoscopic cholecystectomies in whom the detailed anatomy was not clear were excluded from the study.

Laparoscopic cholecystectomies were performed under general anesthesia. The anatomy of cystic artery and its branches were identified, and it was also correlated in relation to cystic duct and common hepatic duct.We performed 240 lap cholecystectomies over a period of 1 year from January 2013 to December 2013.

RESULTS: The pattern of cystic artery was studied in 240 laparoscopic procedures. Origin of cystic artery from right hepatic artery was observed in 82% cases. Double cystic arteries were observed in 8% cases. Common hepatic artery gave rise to 6% cystic arteries. Cystic arteries originated from gastroduodenal artery in 3% cases. Hepatic parenchyma gave rise to 2% cases.

CONCLUSION: Percentage of variations in cystic artery as compared to Caucasians are not different in our study.These variations should be kept in mind to reduce complications.

KEYWORDS: laparoscopic cholecystectomy, calot's triangle, hepatic artery, cystic artery.

INTRODUCTION

Cholelithiasis is the presence of crystal deposits or concretions within in the gallbladder lumen. Cholecystectomy is removal of gallbladder after ligation of cystic duct and its vessels. 80000 cholecystectomies are performed each year in France. Though the prevalence is exactly unknown but such a big number indicate the incidence and prevalence of cholelithiasis is higher in the world[1]. Laparoscopic procedures are being evolved and improved day by day[2, 3]. Nowadays laparoscopic cholecystectomy is gold standard for cholelithiasis[4, 5]. Earlier there were a lot of complications associated with laparoscopic cholecystectomy, because of insufficient knowledge and expertise, injuries to cystic artery, common bile duct, right hepatic duct were not uncommon.[6]Things have changed, morbidity and mortality has reduced because of sufficient expertise and the understanding of variations in cystic artery and right hepatic artery[7,8]. Anatomy of calot's

triangle along with variations in cystic duct and artery is very important. The boundaries of calot's triangle are common hepatic duct, cystic duct and lower edge of liver. Cystic artery crosses calot'striangle, usually arising from right hepatic artery[9,10].

Cystic artery is a branch of right hepatic artery gives small calot's arteries (2-4 in number) divides into superficial and deep branches[10]. The main function of cystic artery is that it supplies blood to gall bladder and surface of liver. Knowledge about variations in distribution of cystic artery is very important because unidentification of variations during hepatobiliary procedures can lead to unexpected bleeding. Bleeding is sometimes uncontrollable and can lead to serious complications[11,12].

Usually anomalous variations of cystic artery are double cystic artery (when superficial and deep branches of cystic artery do not share a common origin, occurs in 15% cases, aberrant origin of right hepatic artery (found in 2-16% cases), left hepatic artery (present in 1% cases), recurrent cystic artery (in less than 1% cases), and low lying cystic artery (in approximately 5% cases)[13,14]. When hepatic artery takes tortuous course in front of origin of cystic duct or right hepatic artery is tortuous and cystic artery is short, this tortuosity is known as caterpillar turn or Moynihan's hump[15].

This study was planned to investigate the variations in the distribution of cystic artery and its relation with the common bile duct per-operatively.

MATERIAL AND METHODS

It was retrospective analysis of 240 cases that underwent laparoscopic cholecystectomies.This study was carried out as part of anatomical studies at Shah Medical Centre, Swat.Routine investigations like ultrasound, FBC, amylase, LFT's, ECG, CXR, and urea/creation were done prior to laparoscopic cholecystectomies. Detailed analysis of about 240 cases including both males and females of different age groups were performed. These cases were carried out from January 2013 to December 2013. Laparoscopic cholecystectomies were performed under general anesthesia.All laparoscopic cholecystectomies performed in Shah Medical Centre in the study period in whom detailed anatomy of calot's triangle was clearly displayed were included in the study. Those laparoscopic cholecystectomies in whom the detailed anatomy was not clearly displayed were excluded from the study.

RESULTS

Variations were observedin the distribution of cystic artery. Among them 50 were males and 190 were females. According to our observation 82% cystic arteries originate from right hepatic artery, cystic artery passed posterior to hepatic duct and entered into calot's triangle and after crossing the calot's triangle these arteries divide into superficial and deep branches. Superficial branch arches over the left border of gallbladder and deep branch passes between the liver and gallbladder.

Cystic artery variations between sexes		
Origin	Females	Males
Right hepatic artery	155	41
Double cystic artery	15	4
common hepatic artery	11	4
gastroduodenal artery	5	1
hepatic parenchyma	3	1
total	189	51

Fig 1 Cystic artery variations between sexes

Double cystic artery was observed in 8% cases where cystic artery divides into superficial and deep branches at its origin from the right hepatic artery. Usually one of the cystic arteries are coagulated by hook rather than clipping.

Among 6% people cystic artery originated from hepatic artery which in turn is a branch of celiac trunk. In 70% cases cystic artery passed anterior to hepatic duct and in 30% cases cystic arterypassedposterior to hepatic duct.

Cystic artery from gastroduodenal artery originatedin 3% cases. Laparoscopically the appearance of this kind of artery is anterior and superficial to cystic duct. This is also called low-lying cystic artery.

Cystic artery variations	Cases	Our study	Caucasians
Right hepatic artery	196	82%	72%
Double cystic artery	19	8%	12.25
common hepatic artery	15	6%	3%
gastroduodenal artery	6	3%	1%
hepatic parenchyma	4	2%	2.50%
Total cases	240		

Fig 2. Comparison of cystic artery variations

Cystic artery also originates from hepatic parenchyma; it can enter gallbladder at sporadic points. When the critical area is finished, it can be present in the centre, right or left during gallbladder dissection. It can also be present in the fundus during gallbladder dissection.In our study this kind of artery was about 1.5% cases.

DISCUSSION

Variations inthe cystic artery were studied and compared it with Caucasians. Total of 240 cases were observed, among them 189 were female and 51 were male. Cystic artery is a branch of right hepatic artery in 155 females and 41 males. It becomes double cystic artery in 15 females and 4 males. Cystic artery is a branch of common hepatic artery in 11 females and 4 males. Cystic artery is a branch of gastroduodenal artery in 5 females and 1 male. Cystic artery arises from hepatic parenchyma in 3 females and 1 male.

In the present study we observed that 82% cystic arteries originate from right hepatic artery, Daseler et al, showed that this kind of artery is present in 72%.[16]In this study double cystic artery was found in 8% casesas compared to 12.25% in Caucasians.[17] Cystic artery originated from common hepatic artery in 6% in our studies, while Bergman et al, showed that it is 3%.[18]Cystic artery originated from gastroduodenal artery in 3% cases as compared to 1% in previous studies[16]. Hepatic parenchyma giving rise to cystic artery found in 2% cases while You-Ming et al showed that it is 2.50%[17].

In the present study data was compared with Caucasians using Microsoft excel. Regression statistics using anova were used in Microsoft excel and P value was taken. P value was 0.85 which is greater than the level of significance 01. The statistics showed that the percentage of variations in cystic artery is statistically similar to that of Caucasians.

CONCLUSION

Cystic artery and anatomy of calot's triangle varies in different individuals. Variations in the cystic artery in our populatin is statistically similar to that of Caucasians. Keeping this in mind will minimize complications. Further studies should be done to understand the variations of cystic artery and it's relation with other structures in depth.

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CORRESPONDENCE ADDRESS

Name: Dr. Muhammad Hussain
Address: House no C-33, Sheikh Maltoon Town, Mardan.
Email: mhussaindr@hotmail.com
Cell No: 03005923813