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Original Article-Anatomy

THE CADAVERIC STUDY OF INCIDENCES OF ACCESSORY CYSTIC ARTERY AND ITS CLINICAL SIGNIFICANCE

Mr.Guntha.Chinna Nagaraju[1], Mr.P.Moula Akbar Basha[2]*, Pankaj Maheria[3], SaiRavi Kiran.Biri[4]

[1]Assistant Professor, DVVPF's Medical College, Ahmednagar, Maharashtra, India.
[2]Assistant Professor, Santhiram Medical College, Nandyal, Andhra Pradesh, India.
[3]Asscoiate Professor, GMERS Medical College, Dharpur, Patan, Gujarat, India.
[4]Assistant Professor, Department of Biochemistry, Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry, India

***Corresponding Author e-mail id:**
Mr.P.Moula Akbar Basha
Assistant Professor,
Santhiram Medical College, Nandyal, Andhra Pradesh, India.
Mail id: moulaanatomy@gmail.com

Abstract:
The cystic artery is the main source of blood supply to the gallbladder and cystic duct. The cystic artery usually arises from the right hepatic artery. It divides into superficial and deep branches at the neck of the gall bladder. The superficial branch ramifies on the inferior aspect of the gallbladder body, the deep branch on the superior aspect. The cystic artery gives rise to multiple fine branches which supply the common and lobar hepatic ducts and upper part of the common bile duct. The present study was conducted to find out the prevalence of double cystic arteries. The recognition of this variation is important to avoid intra-operative bleeding during Cholecystectomy. The study was carried out on 100 adult human cadavers in different medical colleges of the Gujarat region. The variations of a present number of the cystic artery were observed if found then documented and photographed.Out of 100 specimens, 12(12%) specimens present double cystic arteries. Out of 12 specimens in 10 specimens the cystic artery arises from the right hepatic artery and in 2 specimens cystic artery arises from a segmental branch of the right hepatic artery. This study is emphasizing the importance of a thorough knowledge of anatomy and recognition of variations of the cystic artery are essential prerequisites for safe and uneventful laparoscopic Cholecystectomy and can reduce uncontrolled intra-operative haemorrhage and extrahepatic biliary injury. The recognition of anatomical variations is important for avoiding intra-operative haemorrhage during Cholecystectomy.

Keywords: Cystic artery, Cholecystectomy, Gallbladder

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1. Introduction:

The cystic artery is known to exhibit variations in its origin and branching pattern. This is attributed to the developmental changes occurring in the primitive ventral splanchnic arteries.[1] The cystic artery is single usually but double CA can be found. Origin & course of an artery is also variable. This is the most commonly injured artery during cholecystectomy due to frequent variations. Haemorrhage could be a problem during a search of the CA if these variations are overlooked and that increases the rate of conversion to open surgery [2]. The Gallbladder develops from the hepatic diverticulum, which receives blood from the coeliac trunk and superior mesenteric artery. Most of the vessels disappear during development, leaving the mature vascular structures. The complex degeneration process leads to the origin and branching pattern of the vessels to this organ also vary considerably variable [3-4]. It also needs to be kept in mind that, during laparoscopic visualization, anatomical relations are seen differently compared to conventional cholecystectomy [5].

This emphasizes the importance of cystic arterial dissection and the necessity of thorough knowledge of cystic arterial variations for the safe performance of cholecystectomy [2]. An accessory cystic artery is defined as any artery supplying the gallbladder with an abnormal origin but a normal cystic artery is still present. An aberrant artery is defined as any artery supplying gallbladder with an abnormal origin but normal cystic 2 arteries being absent [6]. During surgery unawareness of the presence of an accessory cystic artery can lead to troublesome bleeding.

2. MATERIALS AND METHODS

The study was conducted on 100 human liver specimens with an intact extrahepatic duct system obtained from the cadaver through dissection from the department of anatomy of various medical colleges of South India, over 2 years and observed the presence of cystic artery.

2.1. Inclusion Criteria:

a. Liver specimens with intact Gall bladder with its arteries.
b. Specimens with intact extrahepatic duct system.

2.2. Exclusion Criteria:

a. Injured or lacerated liver and gall bladder.
b. Liver specimen with the absent gall bladder.

3. Result:

In the present study, 100 cadavers were dissected and liver specimens with intact extrahepatic duct systems were retrieved.

Table-1. Termination of accessory cystic arteries

Source of Origin	No. of Specimen	Termination			Total
		Superior Surface of Gallbladder	Inferior Surface of Gallbladder	Join with Cystic Artery	
RHA	01	01	-	-	01

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Liver Parenchyma	11	05	02	04	11
Total	12	06	02	04	12

Table-2. Comparison of presence of Accessory cystic artery with other studies

S. No	Studies	No. of Case	Incidence of Accessory Cystic Artery	Percentage
1	Futara G et al. (2001) [8]	110	11	10%
2	Flint E R (1923) [9]	200	31	15.50%
3	Suzuki M et al. (2000) [10]	244	18	7.50%
4	Present Study	100	12	12%

3. Discussion:

Most errors in gall bladder surgery result from failure to appreciate the common variations in the anatomy of the biliary system. The success and safety of laparoscopic cholecystectomy depend on high regard for accurate knowledge of anatomy and some of the common embryologic anomalies of the biliary tree. The blood supply, ductal variations, and gallbladder anatomy of this area are often the source of the major challenge to unprepared and unaware surgeons.

The explanation for the variations in the cystic artery is found in the developmental pattern of the biliary system. Embryologically, the simple branching pattern of the gastroduodenal and hepatobiliary vasculature is profoundly altered by the growth of the liver and pancreas and by the assumption of a curved form in the stomach and duodenum. These factors operate to complicate the branching of the coeliac axis and proximal segment of the superior mesenteric artery. Considering that the liver is derived from a portion of the primitive duct supplied primordially by the coeliac and mesenteric arteries, it may receive rami from both of these sources. The same is true of the gallbladder. The liver, and gallbladder develop from a foregut endodermal hepatic diverticulum, which usually carries a rich supply of vessels from the abdominal aorta and its initial branches. Most of the vessels picked up from the abdominal aorta during development degenerate leaving in place the mature vascular system. Because the pattern of degeneration is highly variable, the origin and branching pattern of the vessels to these organs also vary considerably. Considering the complexity of this developmental scheme it is easy to understand the large degree of arterial variations within this vascular system. Knowledge of the different anatomical variations of the arterial supply of the gallbladder, liver, and stomach is of great.

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The cystic artery presents an unusually high degree of variability not only in its origin or number but also in its course to the gallbladder. It has surgical importance as it is always ligated during cholecystectomy irrespective of its origin and number. When the artery is ligated, there is always a possible risk of injury to the ducts. If multiple cystic arteries are not identified, they may be torn or [7] cause bleeding in the operative area. Incidence of the accessory cystic artery is observed in 12% of specimens in the present study which is approximately similar to studies performed by Futara G et al [8], who found the presence of an accessory cystic artery in 10% of cases. Flint E.R [9] observed the incidences of accessory cystic artery in 15.5% cases which is higher than the present study and Suzuki M. et al [10] noted the accessory cystic artery in7.50% of cases which are less than the present study.

4. Conclusion:

During laparoscopic cholecystectomy, dissection of a limited field is visualized on the video monitor for detailed anatomical variations of the cystic artery. The present study helps to recognition of such type of variations which has surgical importance and requires special attention in gallbladder surgeries and also helpful to a radiologist to perform an intraoperative cystic angiogram during hepatobiliary surgery and pre-requisites for safe and uneventful laparoscopic cholecystectomy and can reduce uncontrolled intraoperative hemorrhage and extrahepatic biliary injury. The success of laparoscopic, open cholecystectomy, and other procedures are depending upon the anatomical knowledge of the cystic artery and biliary duct system and it is necessary to prevent any iatrogenic complications during surgery.

The importance of a thorough knowledge of arterial supply of the extrahepatic biliary ductal system especially arterial supply of the gallbladder could always present with variations. It requires an extensive in situ exploration before approaching the artery, which helps in reducing uncontrolled bleeding which may increase the risk of an intraoperative lesion to vital vascular and biliary structures. A haemorrhagic episode or a bile leakage that may commonly occur due to variations of the Calot’s triangle structures can be avoided if the artery has been explored for its variations in origin, course, and number. The extensive bleed or bile leak may be one of the most common causes for the conversion of laparoscopic cholecystectomy to open cholecystectomy during surgery.

The unawareness of the presence of accessory cystic artery creates major complications during surgery like haemorrhage. The present study is helpful for the surgeon when performing cholecystectomy. In view of the importance of the variations of the anatomy of the cystic artery which causes injury during cholecystectomy, it is advisable to look occurrence of variation should be assessed with the help of imaging techniques like ultrasound before the procedure.

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Conflicts Of Interest

The authors declare no conflict of interest.

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References

[1]. Hlaing K P, Thwin S, Shwe N. Unique origin of the cystic artery Singapore Med J. 2011; 52(12): e263.

[2]. Dandekar U, Dandekar K.Cystic Artery: Morphological Study and Surgical Significance Anatomy Research International Volume. 2016; Article ID 7201858. 6 pages

[3]. Hiatt JR, Gabbay J, Busuttil RW. Surgical anatomy of the hepatic arteries in 1000 cases. Ann Surg1994;220(1):50-52

[4]. A. K. Sarkar and T. S. Roy.Anatomy of the cystic artery arising from the gastroduodenal artery and its choledochal branch- a case report. J Anat. 2000 Oct;197 Pt 3(Pt 3):503-6.

[5]. Michel NA.: Variational anatomy of the hepatic, cystic, and retroduodenal arteries; statistical analysis of their origin, distribution, and relations to the biliary ducts in 200 bodies. Arch. Surg.1953; 66:20.

[6].Saidi H, Karanja TM, Ogengo JA. Variant anatomy of the cystic artery in adult Kenyans. Clin Anat. 2007; 20:943-5.

[7]. Pai Veena, Lakshmi prabhasubhash, Anupama D, Nagaraj D.N. Dual cystic artery- A case report. Anatomica Karnataka 2011; Vol- 5, (2) page 52-54.

[8]. Futara G., Ali A, Kinfu Y. Variations of the hepatic and cystic arteries among Ethiopians. Ethiopian Medical Journal. 2001; 39(2):133-142.

[9]. Flint ER. Abnormalities of the right hepatic, cystic and gastroduodenal arteries and of the bile ducts. Brit J Surg. 1923; 10:509-19.

[10]. Suzuki M, Akaishi S, Rikiyama T, Naitoh T, Rahman MM, Matsuno S. Laparoscopic cholecystectomy, Calots triangle, and variations in cystic arterial supply. Surg endosc.2000; 4: 141-144.