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Original Research Article

SURGICAL ANATOMY OF THE COMMON HEPATIC ARTERY: A CADAVERIC STUDY

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ABSTRACT

Background: Anatomical variations of the hepatic artery are important in the planning and performance of abdominal surgical procedures. Normal hepatic anatomy occurs in approximately 80% of cases, for the remaining 20% multiple variations have been described

Patients and methods: This is an observational descriptive cross-sectional study Conducted in Dissecting rooms of the faculties of medicine in Sudan during the period from June till December 2017. Seventy Well-dissected cadavers with no disruption of the concerned area were included in the Study

Results: The variations in the hepatic artery were seen in only 4 cadavers (5.7%) ; in two cases (2.85%) an accessory hepatic artery arising from celiac artery was observed and in the other two cadavers (2.85%)there was a replacing hepatic artery that arise from the superior mesenteric artery

Conclusion: Variations in the hepatic arterial system is uncommon in Sudanese cadavers which is matching those reported in the region and are different from those at the international level.

KEY WORDS: Hepatic, hepatic arterial system, Sudanese cadavers, Abdominal surgical procedures.

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INTRODUCTION

Anatomical variations of the hepatic artery are important in the planning and performance of abdominal surgical procedures. Normal hepatic anatomy occurs in approximately 80% of cases, for the remaining 20% multiple variations have been described [1].

For decades, arterial variations of the abdominal aorta and its branches have attracted the attention of anatomists and radiologists due to their prominent significance in surgical specialties. The first description of normal and aberrant celiac trunk anatomy was published in 1756 by Haller [2].Variations in the vascular pattern should be taken into consideration when planning surgical interventions on the abdominal part of the oesophagus, stomach, duodenum, liver, pancreas, gallbladder and spleen [3].

Several studies were done to review of the frequency of normal and aberrant hepatic arteries

using abdominal dissections of cadavers [4].

The common hepatic artery usually arises from the celiac trunk (85% of cases), but may also arise directly from the aorta or from the left gastric, superior mesenteric , gastroduodenal, right renal or splenic arteries. The occurrence of these alternate sources for the common hepatic can be accounted for developmental abnormalities [5].

Aberrant (variant) Hepatic Arteries: Quite often the hepatic artery has an incomplete set of branches because one or the other of its usual branches arises from a source other than the proper hepatic artery from the celiac trunk. Such a vessel, is from an outside source, is spoken of as aberrant (a variation). Aberrant hepatic arteries are of two types, replacing and accessory. An aberrant replacing hepatic artery is a substitute for the normal (usual) hepatic artery which is absent. An aberrant (a variable) accessory hepatic appears in addition to one that is normally (usually) present. Some sort of aberrant (variable) hepatic artery, either replacing or accessory, occurs in approximately 42% of individuals [4].

Together with the usual artery, an accessory hepatic artery may arise from one of the above-named or neighbouring branches. An accessory left hepatic artery may give rise to an oesophageal artery. The common hepatic artery may be doubled, tripled, or missing (12% of cases), in which case one or more accessory arteries derived from one of the above sources may take its place. In one case of three hepatic arteries, a right and left arose independently from the celiac trunk, and one branch arise from the superior mesenteric which supplied the gall bladder. Four hepatic arteries have also been reported. The common hepatic is almost always located between the bile duct and the portal vein [6].The course of the right hepatic artery observed in 165 specimens was as follows: anterior to the bile duct, 64%; anterior to the portal vein, 0.1%; and posterior to the portal vein, 9%. The right hepatic artery arise from the superior mesenteric in 12%.[6] The left hepatic artery arises from the common hepatic in 89% of cases; in 11% of cases the vessel is unusual and may arise from the left gastric. Supernumerary or “accessory” vessels to the left lobe of the liver occur in 23% of cases. In one study, done on 257 cadavers, 21% had one accessory hepatic artery, 9.3% had two, 7% had three, and 3.1% had four. “Accessory hepatic arteries and ducts” must not be considered simply as accessory or extra, but always as an essential, tissue-sustaining blood supply and as mandatory biliary drainage ducts [3].

According to my knowledge there are no studies done in Sudan regarding prevalence of anatomical variations of the common hepatic artery.

METHODS

This is an observational descriptive cross-sectional study Conducted in Dissecting rooms of the faculties of medicine in Khartoum state during the period fromJune till December 2017.All Well-dissected cadavers with no disruption of the concerned area in medical colleges in different cities in Sudan were included in the Study. Data was collected using a master sheet, Data analysis was done using the Statistical Package for Social Sciences (SPSS) version 22 software and result obtained expressed in tables and simple figures.

RESULTS

The total number of cadavers included in this study were 70. Only one cadaver was a female. The variations in the hepatic artery were seen in only 4 cadavers (5.7%). Table (1)

The description of the variations seen in the hepatic artery positive include in two cases an accessory hepatic artery arising from celiac artery and in the other two cadavers there was a replacing hepatic artery that arise from the superior mesenteric artery. Table (1)

Table 1: Shows variations in hepatic artery.

Variant	Number of cadavers	percentage
Normal variant	66	94.30%
Accessory hepatic artery arise from Celiac Artery	2	2.85%
Replace Hepatic artery arise from superior mesenteric artery.	2	2.85%

DISCUSSION

This study included 70 specimens from different faculties of medicine in different Sudanese cities: Khartoum, Dongala and Port Sudan. To my knowledge there was no similar report neither

cadaveric nor in living subjects in Sudan that investigates variations in the hepatic artery.

In this study the normal anatomy of hepatic arterial system was seen in 66 out of 70 cadavers (94.3%) these results were almost similar to regional African studies in keneya, Uganda and Nigeria. All these studies share the same methodology and were done on cadaveric specimens [7-9].

At the international level, results of the present investigation were different when compared to two studies; one American and the other is Brazilian study. In the Brazilian study, which is done on 45 cadavers, variations were noted in 12 specimens. The variations were noted in the common hepatic artery and its branches. In the American study, which is on 1000 donor livers, the variations represented about 24% of the specimen. They arranged the anatomical variations in the hepatic region into 6 types with type I being the normal variat [10,11].

In this study, in two cadavers (2.85%) the accessory hepatic artery was noted to arise from celiac artery. This was different from the finding of Hiatt et al who descripted in their study the accessory hepatic artery to arise from the left gastric artery [10]. Similar observation that the accessory hepatic arteries arise from left gastric artery was reported in one case of cadaveric dissection in India [12].

Also, in this study a replaced hepatic artery was documented to arise from the superior mesenteric artery in two specimens (2.85%). Although there was a difference in number of cadavers, similar finding was described by Tharo et al. [8].

The same results were different from those presented by Hiatt et al in which the replaced hepatic artery seen in 9.7%. This difference may be explained by the different methodology, that they used donor liver, or their large sample size [10].

Study limitations In this study it was difficult to determine the gender differences with regard to the hepatic arteries. This, because there were no enough available female specimens in the examined dissecting rooms. Paucity of female cadavers can be explained by cultural values of Sudanese who are very strict with regard to female cadavers for teaching purposes.

CONCLUSION

The study showed that variations in the hepatic arterial system is uncommon in Sudanese cadavers which is matching those reported in the region and are different from those at the international level.

Recommendations Surgeons who do hepatobiliary surgeries should be aware of the common variations in the anatomy of the hepatic arterial system to avoid bleeding and other complications.

Conflicts of Interests: None

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