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MORPHOMETRY OF THE CAUDATE PROCESS OF LIVER

Anatomy

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ABSTRACT

The liver is the second largest single organ in the human body after skin, with mass of around 1.5kg in average adult. The sickle-shaped falciform ligament on the anterior surface, divides the organ into right and left anatomical lobes. Two other lobes are seen on the visceral surface; the caudate lobe is seen superiorly and the quadrate lobe is seen inferiorly. The detailed morphometry of the caudate lobe was done. Maximum vertical length and horizontal diameter was measured for the caudate lobe along with shape for each specimen using sliding vernier calliper. The caudate lobe is one of the anatomical lobes of the liver present on its visceral surface. It is essential for both radiologists and operating surgeons to have a sound and thorough knowledge of the liver anatomy and also the common variations seen in liver.

KEYWORDS

Liver, caudate lobe, papillary process, falciform ligaments, liver segments

INTRODUCTION:

Liver is responsible for a wide range of vital functions that include blood detoxification and purification, production of bile, metabolism of carbohydrates, fats & proteins, and synthesis of plasma proteins[1]. It is an important site of haemopoiesis in the fetus. In humans, the liver is an essential organ for survival. No artificial organ or equipment has capacity to compensate for the absence of liver function.

Liver is a large, wedge-shaped organ which occupies a substantial portion of the upper part of the abdominal cavity. It occupies most of the right hypochondrium and epigastrium, and sometimes also extends into the left hypochondrium as far as the left lateral line. The liver weighs approximately 5% of the body weight during the period of infancy and it decreases to approximately 2% during adulthood. The liver is the second largest single organ in the human body after skin, with mass of around 1.5kg in average adult. Size of the liver is seen to vary according to sex, age and body size. Anatomically, the liver is divided into four lobes and eight segments. The sickle-shaped falciform ligament on the anterior surface, divides the organ into right and left anatomical lobes. Two other lobes are seen on the visceral surface; the caudate lobe is seen superiorly and the quadrate lobe is seen inferiorly. Besides, accessory lobes are not an uncommon finding. Riedel's lobe is the best known example of a sessile accessory lobe[2].

The major fissures seen on the surface of liver serve as important landmarks for interpretation of the lobar anatomy of liver. This is further helpful in locating the liver lesions. With advancement in the fields of imaging and minimally invasive surgeries, it is essential for both radiologists and operating surgeons to have a sound and thorough knowledge of the liver anatomy and also the common variations seen in liver[3].

MATERIALS & METHODS:

The study was conducted in the Department of Anatomy, K.D. Medical College, Mathura, on 40 human cadaveric liver specimens available. The liver specimens were removed during routine dissection classes for medical students. Specimens with macroscopic evidence of disease were excluded from the study. The liver specimens with no obvious deformity were selected for the study and preserved in 10% of formalin. The detailed morphometry of the caudate lobe was done. Maximum vertical length and horizontal diameter was measured for the caudate lobe along with shape for each specimen using sliding vernier calliper.

RESULTS:

In the current study the average length was found to be 6.7 cm and average width was found to be 3.4 cm. No abnormality was detected in the gross morphology of the caudate lobes. No additional hepatic tissue was found tagged to the caudate lobe under study.

DISCUSSION:

The caudate lobe is one of the anatomical lobes of the liver present on its visceral surface. On the left side, the lobe is bounded by fissure for ligamentum venosum, on the right side, the lobe is bounded by the groove for inferior vena cava, inferiorly by the porta hepatis and superiorly, it continues into the right upper end of the fissure for ligamentum venosum[4].

In the present study, caudate lobe was present in all the 40 specimens, similar to the finding reported by Joshi et al[3]. However, Aktan et al noted absence of caudate lobe with 7.41% out of the 54 livers under study[5]. In a study conducted by Chavan and Wabale 24 specimens had a rectangular shape (48%), 13 pear shaped (26%), 7 oval (14%), 3 (6%) square, 2 (4%) triangular and 1 (2%) inverted flask shaped[6]. Nayak reported an abnormal, dumbbell-shaped caudate lobe in one liver (1.81%) and also the presence of an unusually long papillary process in a liver specimen (1.81%)[7]. In the current study the average length was found to be 6.7 cm and average width was found to be 3.4 cm.

Joshi et al reported a prominent papillary process in 32% of cases3. Sahni et al reported the presence of papillary process in 67 (33.5%) specimens on the inferior surface[8]. In all 50 cases of the study conducted by Chavan and Wabale, the papillary process was not reported6. In a study undertaken by Singh, a prominent papillary process continuing with the caudate process as a border, was reported. In the current study, the presence of papillary process was seen in 2 specimens[9].

Chavan and Wabale and Sahni et al reported that the length ranged from 4.0 to 9.3 cm and 4.0 to 7.2 cm and width from 2.5 to 4.2 cm and 1.8 to 4.1 cm respectively6, 8. These findings were similar to the results of current study where the average length was found to be 6.7 cm and average width was found to be 3.4 cm.

Joshi et al reported the presence of caudate lobe which was made up of two portions, connected by a narrow parenchymal bridge, known as the caudate isthmus3. Singh and Chhabra et al reported an accessory caudate lobe of liver. Singh et al 12 reported duplication of caudate lobe[9,10]. Caudate isthmus and accessory caudate lobe were not observed in any of the specimens of present study.

CONCLUSION:

Liver is a large, wedge-shaped organ which occupies a substantial portion of the upper part of the abdominal cavity. The caudate lobe is one of the anatomical lobes of the liver present on its visceral surface. In the current study, maximum vertical length and horizontal diameter was measured for the caudate lobe along with shape for each specimen using sliding vernier calliper. With advancement in the fields of imaging and minimally invasive surgeries, it is essential for both radiologists and operating surgeons to have a sound and thorough knowledge of the liver anatomy and also the common variations seen in liver.

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