Section: Anatomy

Original Research Article

MORPHOLOGICAL STUDY OF CAUDATE LOBE – A CADAVERIC STUDY

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ABSTRACT

Background: Aim: To throw light on the morphometric variations of the caudate lobe. **Materials and Methods:** 50 formalin fixed livers retrieved from cadavers used for routine dissection for undergraduates. **Result:** Rectangular, pear, bicornuate and irregular shaped caudate lobes were noted. Prominent caudate process in 21 specimens and papillary process in 2 specimens. The harbin's index was calculated to be 0.09 to 0.34. **Conclusion:** The findings from the study may aid the radiologists in making more accurate diagnosis and the surgeons to plan ahead of the surgery according to the condition.

INTRODUCTION

The liver is the largest wedge-shaped abdominal viscera, occupying upper abdominal cavity extending in right hypochondrium, epigastrium, and left hypochondrium till left lateral line. It weighs 2% of the body weight.[1] The caudate lobe (also known as the Spigelian lobe or Couinauds segment-I) is an anatomically distinct segment of the liver that is bounded on the left by the fissure for ligamentum venosum, on the right by the groove for the inferior vena cava, inferiorly by the porta hepatis, and superiorly by the superior surface of the right upper end of the ligamentum venosum.[2] Inferiorly, the caudate lobe of the liver shows a lateral caudate process that extends obliquely to the right lobe of the liver and a medial small projection called papillary process.[3] In some cases, the papillary process of caudate lobe was large and during imaging it can simulate mass in the head of pancreas or periportal lymph nodes.[4]

MATERIALS AND METHODS

Study was done with 50 formalin fixed livers retrieved from cadavers used for routine dissection for medical undergraduate students. Those liver specimens whose morphology was found to be disrupted by any means like surgery or carcinoma was discarded from the study. The shape, size, processes and fissures if any were studied for the caudate lobe. To determine the transverse diameter of caudate lobe, the midpoint of hepatic part of inferior vena cava (I.V.C.) was used as a reference point for the right lateral margin of the caudate lobe.[5] The transverse diameter of the remaining part of right lobe of the liver was recorded by using the same reference point,[5] and the ratio of transverse diameter of caudate lobe to that of the right lobe (CL/RL ratio) of the liver was determined. The inferior level of hepatic part of I.V.C. (or its groove) was determined at the posterior border of caudate process of the caudate lobe of the liver.[6,7] The length of the caudate lobe was measured from its lower border above the porta hepatis and portal vein.[8] The length of the right lobe of the liver was also measured at the level of greatest longitudinal extension. The above said measurements were recorded in mm by electronic digital calibre.

RESULTS

The shape and size of the caudate lobe was noted. The different shapes of the caudate lobe was categorised under either of the following – rectangular, pear, bicornuate or irregular. The present study had 22 specimens with rectangular caudate lobe (Fig 1), 17 pear shaped (Fig 2), 7 bicornuate (Fig 3) and 11 of them could not be put under any of these, so categorised as irregular. Any fissures if present in the caudate lobe were noted, of which 16 specimens showed the presence of fissures (Fig 2) in the caudate lobe. For the dimensions of the caudate lobe its length and width were measured in mm. The average length of caudate lobe (Fig 4) was found to be 44.94mm ranging between 24.1mm and 64.2mm. The width of caudate lobe (Fig 5) averaged to be 25.05mm ranging from 12.2mm to 37.1mm. The maximum transverse dimension and the vertical extent of the right lobe was measured and the Harbins index was calculated. The average of the transverse dimension was found to be 54.94mm ranging 51.5mm to 99.3mm and the

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average length of right lobe was 115.18mm extending between 82.5mm and 138.9mm. The Harbins index is calculated by dividing the transverse dimension of the caudate lobe to its transverse dimension of the right lobe. The index ranged from 0.09 to 0.34 averaging around 0.21. The prominence of caudate and papillary process was noted. In 21 specimens the caudate process (Fig 6) was found to be prominent and in 2 specimens papillary process (Fig 7) was found to be prominent. Both the processes were prominent in 3 specimens.

Figure 1: Rectangular caudate lobe

Figure 2: Pear shaped caudate lobe with a fissure

Figure 3: Bicornuate caudate lobe

Figure 4: Measuring the length of caudate lobe

Figure 5: Measuring the width of caudate lobe

Figure 6: Caudate process

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Figure 7: Papillary process

DISCUSSION

The caudate lobe was found in all the 50 liver specimens taken for the study. In the present study the shape of the caudate lobe was rectangular in 44% of the specimens, pear shaped in 34% of the specimens. 7% had bicornuate shape and 8% were irregular in shape. Prasad et al,[10] reported 31.25% of rectangular, 54.16% of pyriform and 14.58% of irregular shaped caudate lobe. Sarala HS et al,[9] had noticed 58% of caudate lobe rectangular shape, 10% pear shaped, 20% irregular and 8% triangular shaped. Ibrahim Hassan,[12] has noted 73.21% of rectangular, 21.43% of triangular and 5.36% of irregular shaped caudate lobe.

Vertical fissures extending from the lower border of the lobe upwards was seen in almost 42% of the specimens in the current study. Haobam Rajajee Singh et al,[11] reported a 27%, Prasad et al,[10] reported a 12.5% and Sarala HS et al,[9] a 30% and Ibrahim Hassan,[12] noted a 26.79%.

With regards to the prominence of caudate and papillary processes, the present study showed prominent caudate process in 42% of specimens, papillary process in 4% of specimens and 6% showed prominence of both processes. Sarala et al,[9] noticed 9% of specimens with prominent papillary process and 9% with caudate process. Joshi et al,[3] and Ibrahim Hassan,[12] reported respectively 32% & 42.86% of prominent papillary process and has not reported any prominent caudate process. The present study differed with the findings as said above.

The length of caudate lobe ranged between 24.1 to 64.2mm averaging to 44.94mm in the present study. Prasad et al,[10] found the range to be 49.61 to 70.22mm that averaged to 57.46+5.26mm. Ibrahim Hassan,[12] reported the average length to be 57.45+4.74mm ranging between 46.85 to 69.63mm.

Prasad et al,[10] noticed the average width of caudate lobe to 30.05+4.93mm ranging 19.23 to 43.01mm. Ibrahim Hassan,[12] reported an average of 27.49+2.82mm between 22.16 to 37.16mm. The present study noted an average of 25.05mm ranging between 12.2 to 37.1mm.

The transverse diameter of right lobe was found to be averaging 54.94mm in the present study with Prasad et al,[10] reporting an average of 90.87+12.52mm and Ibrahim Hassan,[12] found an average of 90.58+7.76mm. The average length of right lobe in present study is 115.18mm in the present study while Prasad et al,[10] reported 127.31+11.57mm.

The Harbin's index in the present study is 0.21 ranging 0.09 to 0.34. The same was reported by Prasad et al,[10] to be 0.14 between 0.074 and 0.244 and by Ibrahim Hassan,[12] to be 0.30+0.03 ranging 0.22 to 0.38.

CONCLUSION

Knowing the possible variations of the caudate lobe that has been reported already helps a surgeon not to be taken by surprise during the surgery. Radiologists can diagnose more clearly keeping in mind the fissures that can be present, prominence of the processes and the normal range of Harbins index. It helps in ruling out cysts, cirrhosis and planning the steps of surgery for a smooth conduct.

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