

## ORIGINAL ARTICLE

## A Cadaveric Study of Caudate and Quadrate Lobes of Liver and its Clinical Correlation

Shweta S Thorat<sup>1</sup>, Manoj P Ambali<sup>2</sup>, Vidya S Kharat<sup>1</sup> and Ganesh Khemnar<sup>1</sup><sup>1</sup>Department of Anatomy, Bharati Vidyapeeth (Deemed to be University) Medical College, Pune- 411043<sup>2</sup>Department of Anatomy, Krishna Institute of Medical Sciences, karad-415539, Maharashtra, India.**Abstract:**

**Background:** The liver is the large sized organ present in the abdomen. The knowledge of morphology and variations of liver are important. Livers were observed for presence of morphological variations in Caudate and Quadrate lobes. **Aim:** To study morphology of caudate and quadrate lobes of liver in cadavers. **Material and Methods:** The study of caudate and quadrate lobe on 160 cadaveric livers was done after Ethical clearance. Height, Breadth of caudate and quadrate lobes were taken with Vernier calliper. **Result:** Observations of Caudate lobe showed fissures with frequency 5 and seen in 3.2%; accessory lobes with frequency 2 and seen in 1.2%; no variation with frequency 153 and seen in 95.6%; mean length and breadth of caudate lobe were 5.04 and 2.77 respectively. Quadrate lobe observations showed quadrate lobe connecting to left lobe with frequency 23 and seen in 14.4%, fissures with frequency 7 and seen in 4.4%, lobe with frequency 14 and seen in 8.8%, no variations with frequency 116 and seen in 72.5%, length and breadth 5.77 and 3.41 respectively. **Conclusion:** Showed various morphological variations of liver. It is highly significant to radiologist, surgeons and clinicians to have a detailed understanding of the morphology and its variations of caudate and quadrate lobe of liver in this current age of modified advanced imaging techniques in diagnosis, minimum invading approaches and transplantation surgery.

**Keywords:**

Liver, Caudate lobe, Quadrate lobe, Fissure, Accessory lobe

**Introduction:**

The liver is the large sized organ present in the abdomen. The quadrate lobe bounded anteriorly by inferior border of liver, posteriorly by porta hepatis, on left side by fissure for ligamentum teres, and fossa for gall bladder on the right side. Caudate lobe bounded by ligamentum venosum on left side, inferiorly porta hepatis and groove for inferior vena cava on right side. Caudate lobe connected to right lobe by narrow tongue like extension, caudate process. Below and to left caudate lobe has small rounded projection known as papillary process.<sup>[1]</sup>To study normal

morphology and various morphological variations in caudate and quadrate lobe in human cadaveric liver with the objectives to observe normal morphology of caudate and quadrate lobe and observation of morphological variations of caudate and quadrate lobe.

**Material and Methods:**

After obtaining the ethical clearance we studied 160 cadaveric livers in Bharati Vidyapeeth Deemed to be University, Medical college, Pune. During routine dissection liver specimens were preserved in 10% formalin after it's removed from bodies. Livers were taken out of formalin at least 15 hours prior to examination, to become complete dry. All the livers were apparently normal in appearance. Liver was observed carefully. All livers were observed for presence of variations in dimensions, contour, additional lobes, extra sulci in Caudate and Quadrate lobe. Photographs were taken to document the variations. All collected data were analysed and tabulated. In our present study, we measured maximum height and maximum breadth of caudate and quadrate lobes by Vernier calliper.

We had observed for caudate and quadrate lobes, fissures, accessory lobes. Morphometric analysis of all parameters were done, with the help of same instrument on all 160 livers. In order to avoid observer's error, analysis was done by two observers. Study was conducted on intact cadaveric livers which do not have any obvious deformity. Damaged liver, liver with abscess, tumours, tuberculosis, liver with cirrhosis were excluded. Sample size (99) was calculated by formula:  $N = 4p/L^2$

**Results:**

All the specimens were observed for presence of accessory fissures, accessory lobes (Figure No.1). Table No.1. shows result of Caudate Lobe- Accessory Lobes /Fissures and Table No. 2 shows length and breadth of caudate lobe. All the livers were observed for presence of accessory fissures, accessory lobes (Figure No.2) and connection between quadrate lobe with left lobe of

liver(Figure No. 3). Table No. 3 shows result of Quadrate Lobe–Accessory Lobes /Fissures. Table No. 4 shows result of length and breadth of quadrate lobe. Quantitative variables are calculated by using mean & Standard Deviation( Measure of dispersion). No other test is required.

Table No. 1: Result of Caudate Lobe- Accessory Lobes / Fissures

Caudate Lobe /Fissure	Frequency	Percentage
No variations	153	95.6
Fissure/s	5	3.2
Lobe/s	2	1.2
<b>Total</b>	<b>160</b>	<b>100.0</b>

Table No. 2: Result of Length and Breadth of Caudate lobe

Caudate lobe Parameters	No	Range	Min	Max	Mean	Std. Deviation
Length	160	4.9	2.9	7.8	5.04	0.98
Breadth	160	5.4	0.8	6.2	2.77	0.85

Table No. 3: Result of Quadrate Lobe –Accessory Lobes /Fissures

Quadrate Lobe- Lobe /Fissure	Frequency	Percentage
No variations	116	72.5
Left lobe connected quadrate lobe	23	14.4
Fissure/s	7	4.4
Lobe/s	14	8.8
<b>Total</b>	<b>160</b>	<b>100.0</b>

Table No. 4: Result of Length and Breadth of Quadrate lobe

Quadrate lobe Parameters	No	Range	Min	Max	Mean	Std. Deviation
Length	160	7.6	2.2	9.8	5.77	1.33
Breadth	160	6.4	1.0	7.4	3.41	1.09

**Discussion:**

The knowledge of morphology and variations of liver are important. Morphological variations in the liver are usually asymptomatic. If multiple accessory fissures were present, it gives macro nodular appearance on CT scan. Accessory

fissures might be due to muscular invagination of diaphragm<sup>[2]</sup>.

Figure No. 1: Accessory Lobe on Caudate lobe

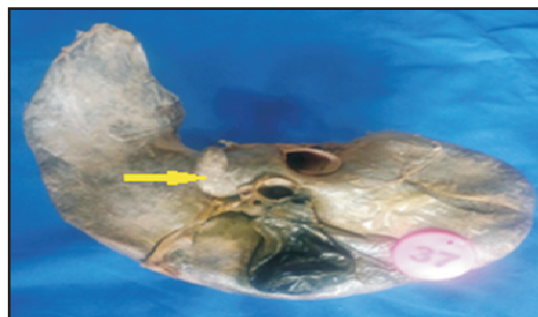


Figure No.2: Accessory Lobe on Quadrate Lobe

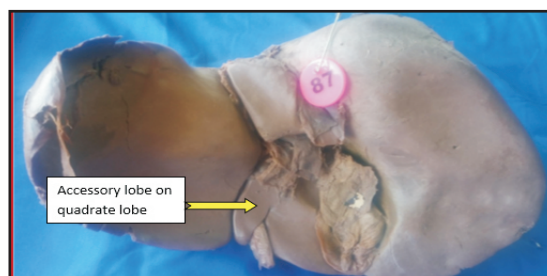
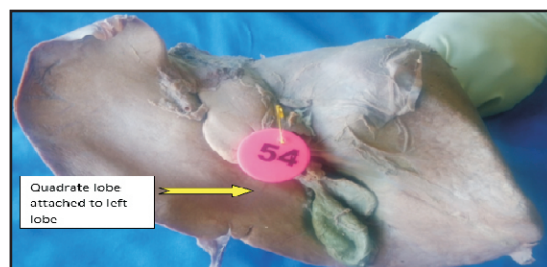


Figure No. 3 : Quadrate lobe attached to the left lobe



Variations of Caudate and Quadrate lobe can be acquired or congenital.<sup>[3]</sup> Presence of excessive lobes are due to excessive development. Non development or defective development leads to agenesis.<sup>[4]</sup> Retraction of hepatic capsule or desmoplasia are due to tumour necrosis which also gives rise to pathological grooves on liver surface.<sup>[5]</sup> Resemblance of pathological liver disease during imaging because of presence of accessory sulci and grooves on lobes, can leads to false positive result. False appearance of intrahepatic focal lesions are due to accumulation of tumour cells into the fissure spaces.<sup>[6]</sup> In trauma patients accessory sulci mimic laceration.<sup>[7]</sup> Presence of accessory sulci can cause complication during liver transplant<sup>[8]</sup> The ischaemic complications during the resection of liver seen in living donor.<sup>[9]</sup> In surgical and percutaneous hepatobiliary interventions, normal and abnormal anatomy of the

liver is important to know. Considering the clinical importance of this topic we decided to work on this topic. Present study shows 3.2% of liver with presence of fissure on caudate lobe. The similar findings by H Chaudhari et al<sup>[3]</sup>(3.7 %) and Satish Jain et al<sup>[10]</sup>(2.77%). Present study correlates with above authors. Mamatha Y.<sup>[11]</sup> (12%), Joseph Abraham<sup>[12]</sup> and Tallapane S<sup>[13]</sup>.(6.66%); reported very high occurrence of fissures on caudate lobe. Accessory lobes on caudate lobe are present in 1.2%. Neel K Arora<sup>[4]</sup> reported such lobe (19.44%) and Mamatha Y<sup>[11]</sup>.(12%); present study shows no correlation with the findings of these authors. Present study reports, length of caudate lobe,  $5.04 \pm 0.98$  cm and breadth  $2.77 \pm 0.85$  cm; Mohini J<sup>[15]</sup> reported  $5.33 \pm 1.01$ cm length and  $2.75 \pm 0.65$  cm. Neel K Arora<sup>[15]</sup> reported 3.38-7.38cm length and 1.2-4.24cm breadth. Singh HR.<sup>[16]</sup> et al found underdeveloped caudate lobe. Our study correlates with study of MohinijoshiY.<sup>[15]</sup> Present study shows accessory fissure on quadrate lobe in 4.4%, while SachinPatil<sup>[17]</sup> reported in 4%, Ranjana Singh<sup>[18]</sup> in 5%, Mamath Y<sup>[15]</sup> in 10%, but Namrata Reddy<sup>[19]</sup> reported in 56.25% livers. Accessory lobe in present study were 8.8%; while MamathY<sup>[11]</sup> reported 10% and SachinPatil<sup>[17]</sup> reported in only 2%. Our study reported connection between quadrate lobe and left lobe in 14.4%. Aktan Z A<sup>[20]</sup> reported such connection in 14.81%, Khedekar Deepak<sup>[21]</sup> reported in 14%, TsegayeMehare<sup>[22]</sup> in 9.09%, Mohini J<sup>[15]</sup> reported in 13%, Sangeeta M<sup>[23]</sup> in

4.3%, S D Joshi<sup>[24]</sup> in 30% of livers. The present study showed average length is 5.77 (range 2.2 – 9.8cm) and breadth is 3.41(range 1 – 7.4 cm) of quadrate lobe. Namrata Reddy et al<sup>[18]</sup> reported average length and breadth were 5.48 cm & 2.48 cm respectively.

#### Conclusion:

Present study showed morphological variations of Caudate and Quadrate lobe. The study will be helpful for radiologists and surgeons to reduce false positive reports and to give more specific diagnosis. This knowledge will be helpful for surgeons to improve structured procedures and successful post-operative results. It is highly significant to radiologist, surgeons and clinicians to have a detailed understanding of the morphology and its variations of caudate and quadrate lobe of liver in this current age of modified imaging, latest advancing techniques in diagnosis, minimum invading approaches and transplantation surgery.

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#### Conflict of Interest - Nil

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**Corresponding author :**

Dr. Khemnar Ganesh B.  
 Department of Anatomy,  
 Bharati Vidyapeeth Medical College,  
 Pune, Maharashtra, India  
 Mobile No: +919834448205  
 Email: ganesh.khemnar@bharativedyapeeth.edu

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