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ORIGINAL ARTICLE

Morphological Variation of liver and it's clinical importance

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ABSTRACT

Background:

Liver is the largest abdominal viscera located in right hypochondrium, epigastrium and left hypochondrium in the abdomen proper.The present study helps radiologists in diagnosis and surgeons in preventing undue surgical complication. The most common causes for morphological variation of liver is embryological in origin.

Aim: To determine gross anatomical variations of liver and its clinical importance.

Materials and methods: A total of 50 formalin fixed cadaveric livers irrespective of the age ,gender studied in the Department of Anatomy, Basaveshwara Medical College and Hospital, Chitradurga , *Subbaiah Institute Of Medical Sciences Shimoga* Karnataka. Morphological variationswere found in 34 cadavers .The preserved normal livers were studied under day light and photos were recorded.

Results: 68%specimens had variations(34 out of **50)**. Accessory fissures were seen in 26 (52%) specimens ,elongated left lobe in 8 (16%) specimens and lingular projection of left lobe in 6(12%) specimens. Ponshepatis observed in 5(10%) specimen. Hypertrophied papillary process was present in 4(8%)specimen.

Conclusion:

Knowledge of such morphological variations will help the anatomist , radiologists in better interpretation and also surgeons to plan for surgical procedures thereby preventing undue complications.

KEY WORDS: Liver morphology, accessory fissures and lobes.

INTRODUCTION:

The liver is wedge shaped, largest gland of the body. It is situated under the right dome of diaphragm and mainly occupies the right hypochondrium and epigastric region. Anatomically, the liver is divided into right and left lobes by the attachment of falciform ligament, fissure for ligamentum teres and fissure for ligamentum venosum. The quadrate lobe is bounded by gall bladder fossa to the right, a short portion of inferior border anteriorly, the fissure for ligamentum teres to the left, and porta hepatis posteriorly. The caudate lobe is

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visible as a prominence to the right of fissure for ligamentum venosum, and posterior to porta hepatis. To its right, is groove for Inferior venacava [1].

The physiological lobes are separated by an imaginary plane passing through antero-superior surface along a line joining cystic notch to groove for IVC. The right lobe is subdivided into anterior and posterior segments, and left lobe into medial and lateral segments.

A sound knowledge of the normal and variations of liver anatomy is a prerequisite for outcome of surgery and also in minimal invasive surgical approaches. Morphological variations of the liver are presence of accessory fissures, lobes or cyst.Other anomalies are atrophy or absence of one of the lobes .The accessory lobe usually seen infra-hepatically and the cause is unknown. The example of a accessory lobe is Riedel's lobe, which mimics like tumour[2]. The surgeon may confuse a small accessory lobe with a lymph node and remove it during surgery leading to bleeding due to vascular damage [3].

Aim of the present study is to create awareness of morphological variations of liver for anatomist ,radiologist and surgeons.Thereby it helps radiologist for interpretation and surgeons for planning and performing the surgical procedures, and also embryologist to throw light on developmental cause for such new variants.

MATERIALS AND METHODS:

The observational study was conducted on 50 liver specimens in the Department ofAnatomy,Basaveshwara Medical College and Hospital, chitradurga, *Subbaiah Institute Of Medical Sciences Shimoga* Karnataka,India. The specimens were obtained from cadaver during routine dissection of under graduates medical teaching.

The formalin preserved livers were observed for any surface variations such as abnormal fissures or lobes, elongation or hypoplasia of lobes, etc. Photographs were taken and results were tabulated. The damaged specimens were excluded from the study.

RESULTS:

In the present study, out of 50 liver specimens, variations were observed in 34(68%) specimens observations was tabulated in [Table-1]. Accessory fissures was seen in 26 (52%) specimens observed mainly on antero-superior surface (16specimens) [Fig-1], fissure on caudate lobe [Fig-2] fissure on posteroinferior surface of left lobe [Fig-3]. Elongated left lobe [Fig-4] was present in 8(16%) specimens. Pons hepatis, [Fig-5] a bridge of tissue connecting the quadrate lobe and the left lobe was observed in 5(10%) specimens and in 4specimens (8%) hypertrophied papillary process noted [Fig-6]. Lingular projection of left lobe seen in 6 specimens (12%)[Fig-7].Other variations like Riedel's lobe, not found in the present study.

[Table -1]: Table shows the pattern of variations observed in present study

VARIATIONS		Number of liver	Percentage
Accessory fissures	Anterosuperior surface of right lobe	16	32%
	Caudate lobe	5	10%
	Posteroinferior surface of left lobe	5	10%

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Elongated left lobe	8	16%
Lingular projection of left lobe	6	12%
Pons hepatis	5	10%
Hypertrophied papillary process	4	8%

DISCUSSION:

In this study human liver presents with an array of congenital variations which are tabulated in the below table in comparision to other studies.

[Table-2]: comparison between present study and other studies.

Variations	Patil S et al., [3]	Joshi SD et al., [4]	Singh HR and Rabi S [5]	Muktyaz H et al., [6]	Chaudhari HJ et al., [7]	Pooja Dawani etal[8]	Sambhav K, Krishna H, Dixit S, et al[12]	Present study
Accessory fissures	10%	30%	81.42%	12.1%	12.5%	32%	80%	52%
Pons hepatis	10%	30%	22.86%	-	1.25%	16%	5%	10%
Elongated left lobe	-	-	12.86%	-	12.5%	14%	12.5%	16%
Hypertrophied papillary process	-	32%	32%	-	1.25%	12%	17.5%	8%

The common congenital liver anomalies are due to defective development or excessive development and sometimes these deformities are present with abnormality of diaphragm and suspensory apparatus of the liver [11]

In this current study, accessory fissures were observed in 52%of livers, out of this 32% shows fissure on anterosuperior surfaceof right lobe, 10% of fissure in posteroinferior surface of left lobe and 10% fissure of caudate lobe..Incidence of accessory hepatic fissures are in the following order more on the right lobe followed by left lobe than the caudate lobe the cause is unknown. Joshi SD et al., [4] documented these fissures are more common in the right lobe followed by the quadrate lobe which is not the observation in our study[4].

According to Auh YH et al., these fissures form a site of fluid accumulation which are misinterpreted as liver abscess, liver cyst and intrahepatic haematoma . Implantation of peritoneally disseminated tumour cells into these spaces may mimic intrahepatic focal lesions [9].

Accessory hepatic fissure may be single or multiple and extends only to the upper part of liver[4]. It is seen commonly in elderly patients the upper part of right lobe of liver is

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invaginated by diaphragm. On sectional imaging modalities, the accessory fissures are seen as thin lines projecting inward from the periphery of the liver [4] .

Macchi V et al., suggested that the diaphragmatic sulci acts as a guideline for projecting portal fissures and of the hepatic veins with their tributaries running through them.It occurs due to resistance offered by the diaphragm when liver develops [10].A higher incidence of these grooves was observed by Singh HR and Rabi S [5] followed by Sambhav K, Krishna H, Dixit S, et al[12] and lowest by Patil S et al., [3] but in the present study diaphragmatic sulci present in 32% specimens.

Pons hepatis connects the quadrate lobe with the left lobe across the fissure for ligamentum teres by means of hepatic tissue. As result of it left and right anatomical lobes are not well demarcated.Hence surgeon finds difficulty in lobectomy and also the radiologist may misinterpret the pons hepatis as a hepatic mass.

The pons hepatis was observed in 10% in present study ,similar to that of Patil S et al., [3] lowest by Chaudhari HJ et al., (1.25%) [7]

Elongated left lobe acts as a predisposing factor for gastric volvulus and diaphragmatic hernia [11] .while performing left lobe resection it's relation to fundus of stomach should be kept in mind to avoid undue complications during surgery. In this study incidence of elongated left lobe present is 16% little higher incomparison to the previous study as tabulated.

The papillary process of the caudate lobe of the liver may appear separate from the liver and thus mimic lymph nodes or a pancreatic mass when it is enlarged.The incidence of hypertrophied papillary process is 8% in present study, the higher incidence of 32% was reported by Joshi SD et al[4] and Singh HR and Rabi S [5]

CONCLUSION:

The present study concludes the incidence of morphological variations of the liver is common .Hence such knowledge is essential for anatomist to know about such variation which helps the radiologist in diagnosis ,for surgeons and gastroenterologist to prevent undue complications while operating.

REFERENCES:

1.Standring S. Gray's Anatomy: The anatomical basis of clinical practice 40[1] th ed. New York: Churchill Livingstone 2008; 3441-46.

2.Muktyaz H, Nema U. Morphological variations of liver lobes and its clinical significance in north Indian population. GJMMS.2013;1(1):1-5.

3.Patil S, Sethi M, Kakar S. Morphological study of human liver and its surgical importance. Int J Anat Res. 2014;2(2):3 10-14.

4.Joshi SD, Joshi SS, Athavale SA. Some interesting observations on the surface features of the liver and their clinical implications. Singap Med J. 2009;50 (7):715-19.

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5.Singh HR, Rabi S. Study of morphological variations of liver in human. Translational [5] Research in Anatomy. 2019;14:1-5. DOI: 10.1016/j.tria.2018.11.004.
6.Muktyaz H, Nema U, Suniti RM, Mahboobul H. Anatomical study of accessory [6] sulci of liverand its clinical significance in north Indian population.. Int J Med Health Sci. 2013;2(20):224-29. **NOT FOUND**

7.Chaudhari HJ, Ravat MK, Vaniya VH, Bhedi AN. Morphological study of human [7] liver andits surgical importance. J Clin Diagn Res. 2017;11:AC09-12. doi: 10.7860/ JCDR/2017/24467.10020

8. Pooja Dawani et.al., Morphological Variations of Human Cadaveric Liver and their Clinical Significance International Journal of Anatomy, Radiology and Surgery. 2021 Apr, Vol-10(2): AO13-AO15 10.7860/IJARS/2021/42494:2624

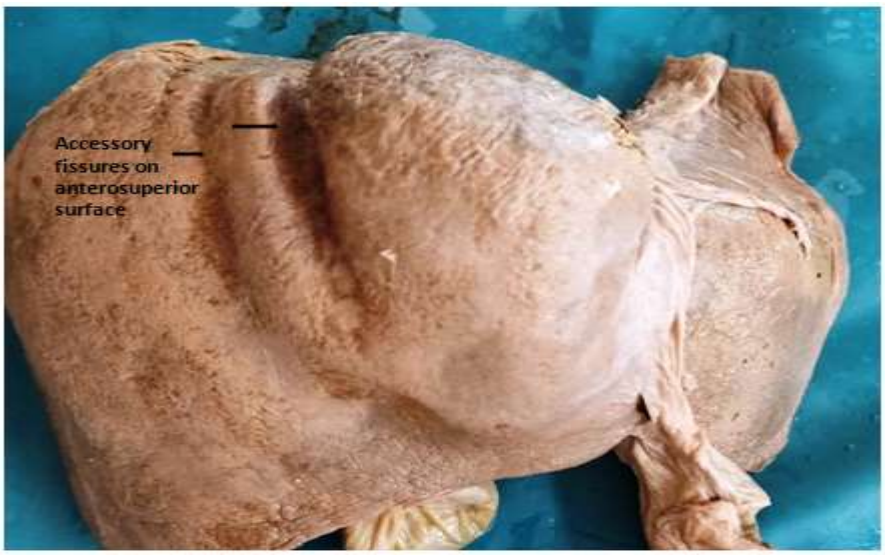
9.Auh YH, Lim JH, Kim KW. Loculated fluid collections in hepatic fissures and 6] recesses: CT appearance and potential pitfalls. Radiographics. 1994;14:529-40. 10.1148/radiographics.14.3.8066268

10.Macchi V, Feltrin G, Parenti A, De Caro R. Diaphragmatic sulci and portal fissures. J Anat. 2003;202(3):303-08.

11.Daver GB, Bakhshi GD, Patil A, Ellur S, Jain M, Daver NG. Bifid liver in a patient with diaphragmatic hernia. Indian J Gastroenterol. 2005;24(1):27-28. 15778526

12.Sambhav K, Krishna H, Dixit S, et al. (February 26, 2023) Morphological Study of Variations of the Human Cadaveric Liver and Its Clinical
Implications. Cureus 15(2): e35507. 10.7759/cureus.35507

[Table/Fig-2]: Accessory fissures on antero-superior surface of liver.



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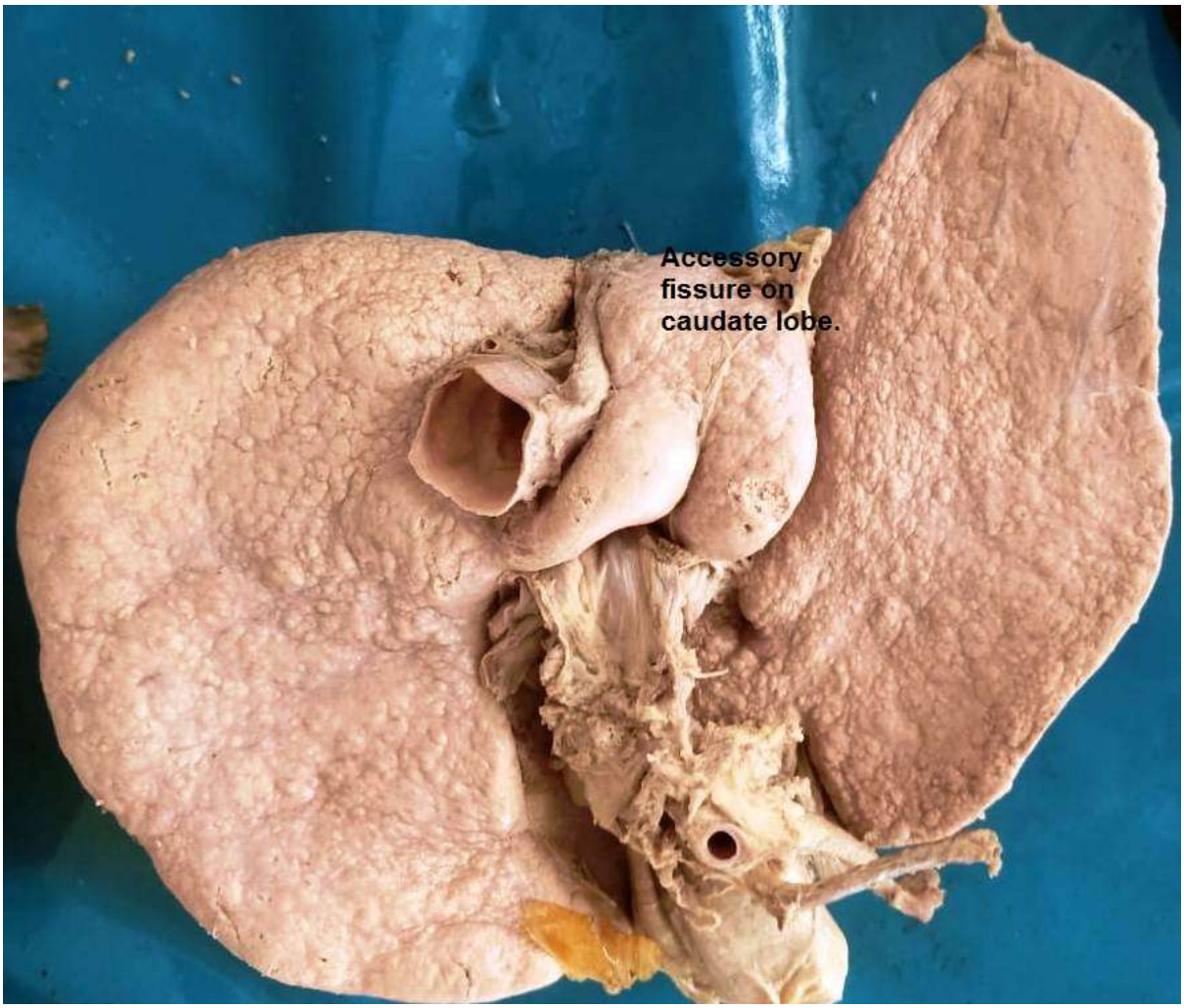
[Table/Fig-3]: Accessory fissure on caudate lobe.



[Table/Fig-4]: Accessory fissure on postero-inferior surface of left lobe.

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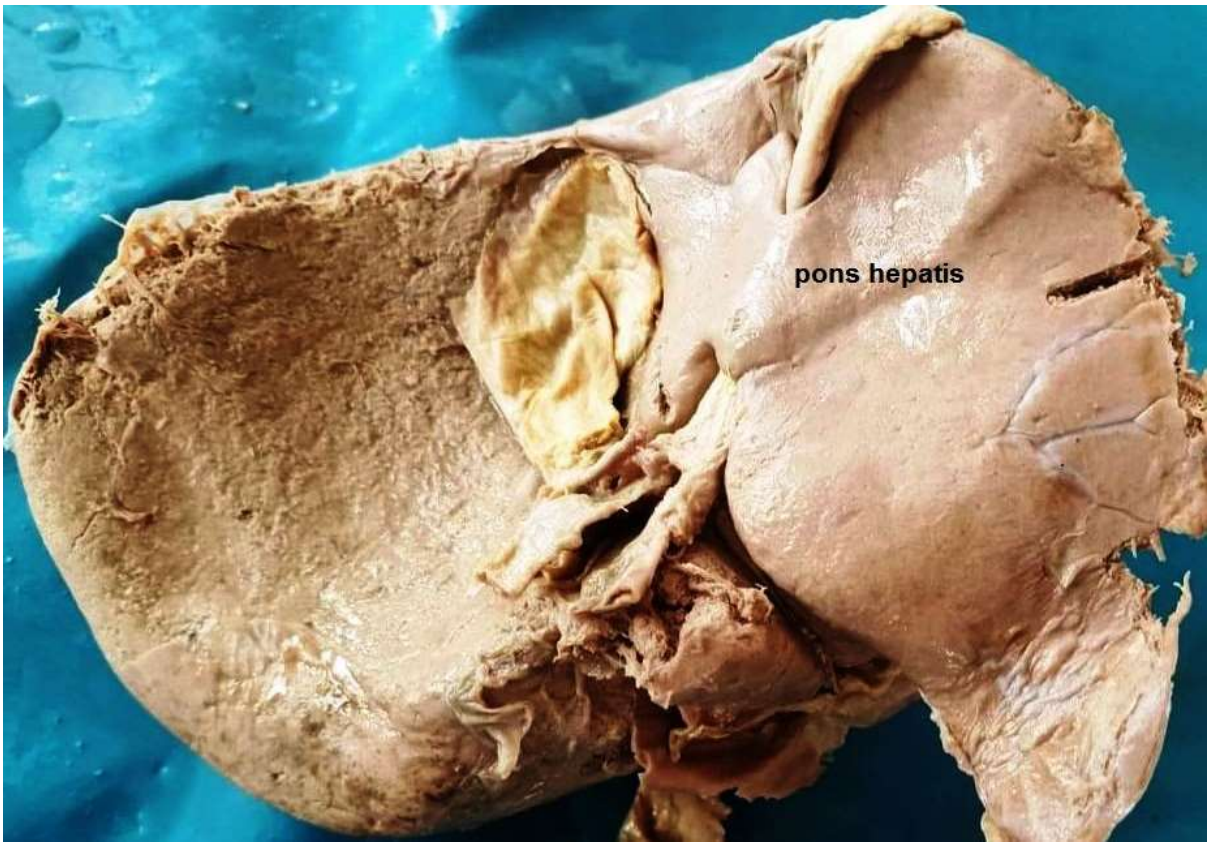
[Table/Fig-5]: Showing elongated left lobe.

[Table/Fig-7]: Showing pons hepatis connecting quadrate lobe with the left lobe.



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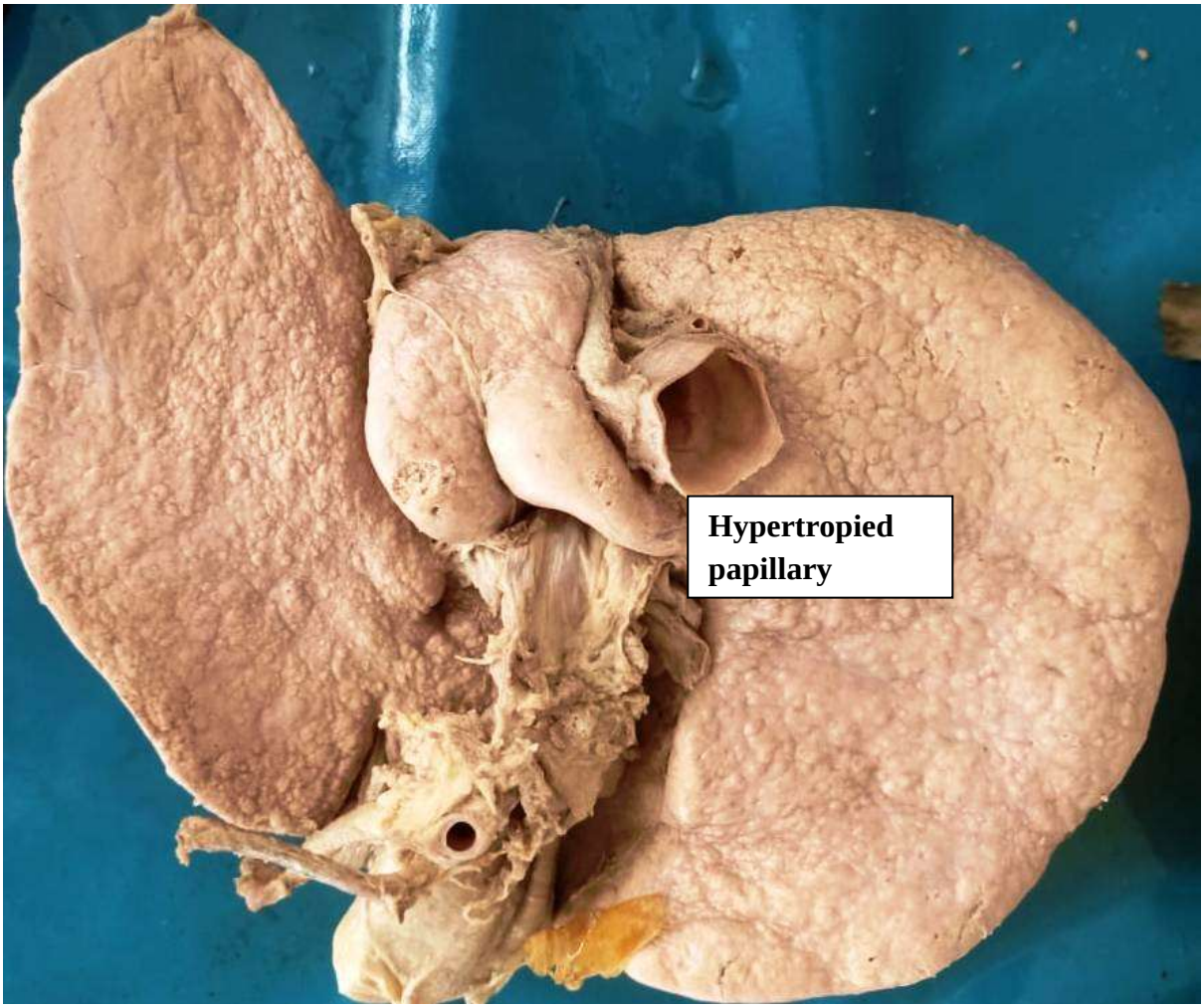
[Table/Fig-8]: Showing hypertrophied papillary process of caudate lobe.



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[Table/Fig-6]: Showing lingular projection of left lobe of liver.