Morphological and Quantitative analysis of Human Liver- A Cadaveric Study

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Abstracts: **Introduction:** Knowledge of the normal liver morphology and its variants important in the era of diagnostic imaging and minimally-invasive surgical approaches. **Method:** 50 formalin-fixed livers were utilised for the study. Studied liver classified according to morphological types. **Result:** Normal liver found in 48% cases. Remaining 52% cases found variations out of that 28% cases found liver with lingular process and 12% cases found liver with diaphragmatic surfaces. Costal liver with very small left lobe and deep impressions in 6% cases,2% cases of Liver with total atrophy of the left lobe,2% cases of Liver with deep renal impressions and "corset" type constriction and 2% cases of Liver with right lobe very much smaller than the left. **Conclusion:** Our study highlights variations in liver morphology ,knowledge of these important for surgeon and radiologist
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Introduction: Liver is the largest wedge shaped gland of human body which is predominately occupies the right hypochondrium but the Left lobe extends to the epigastrium. Although it frequently extends into the left hypochondrium as far as the left lateral line. Its domed diaphragmatic surface is related to the diaphragm and its lower border follows the contour of the right costal margin under the right dome of diaphragm. Liver is major organ for metabolism and detoxification.

The liver capsule plays an important part in maintaining the integrity of its shape. Liver has been divided into right, left, caudate and quadrate lobes by the surface peritoneal and ligamentous attachments. The falciform ligament superiorly and the ligamentum venosum, inferiorly, mark the division between right and left lobes. On the inferior surface, to the right of the groove formed by the ligamentum venosum there are two prominences separated by the porta hepatis. The quadrate lobe lays anteriorly, the caudate lobe posteriorly. The gallbladder usually lies in a shallow fossa to the right of the quadrate lobe.[1]

Variation in anatomy of human liver is classified into congenital and acquired. Congenital abnormalities are absence of right lobe or left lobe and Partial atrophy of right lobe or left lobe. Absences of either caudate lobe or quadrate lobe. Presence of fissure in quadrate lobe. Accessory lobe, lobes without division also found in literatures[2].

Aim of the present study was to analysed the type and frequency of anatomical variations in cadaveric livers.

Material & Method: The Study was conducted on 50 liver obtained from formalin fixed cadavers used for undergraduate students study during period of 4 years in Smt N.H.L.Municipal medical college Ahmedabad, Each specimen was studied for morphological variations. Anthropometric measurements of the livers were recorded. Height (measured from the bottom of the right hepatic lobe), transverse diameter (extending from the right side edge of the right hepatic lobe to the tip of the left lateral lobe) and thickness (from the front of the right hepatic lobe to the rear of the same lobe) recorded and weight taken from electronic weight machine.

Result: 61 livers in this studied distributed according to 9 morphological types[3] mention in Table-1. Type 1-7 Mention by Netter[3] and type 8 & 9 mention by Nagato et al[4] .

Discussion: Knowledge of anatomical and morphological variations of liver is important for anatomist as well as for radiologist and surgeon. Variations in lobes and fissures are become very important for radiologist and surgeons with developing imaging technique and minimal invasive approaches. In present study we found 48% normal Liver. Remaining 52% liver have variations in morphological types. Study done by

Nagato AC et al[4] on liver morphology found 42.6% normal liver and in 52.7% variation in morphological types. Nagato et al[4] found type 2 in 8.19% and in present study found 6% cases. Type-3 found in 2% cases in present study similar 1.64% cases found by Nagato et al[4].

Normal liver-type-1

Type-2 costal liver with very small left lobe

Type -3 Liver with left lobe atrophy

Type:5 lingular process

Type-7 diphragmatic impression

Type-8 Left lobe larger than right lobe

Type -5 (Lingular process) found in 28% cases in present studies higher than found by Nagato et al[4] in 21.31% cases. Type 6 found in 2 cases which is lower that found by Nagato et al in 9.84% cases.

Table:-1 : Frequency distribution of morphological types of human livers

Sr.No	Organ type Characteristic features	No. of examples	Frequency (%)
1	Normal liver	24	48%
2	Costal liver with very small left lobe and deep impressions	3	6%
3	Liver with total atrophy of the left lobe	1	2%
4	Transversal liver with a large left lobe	0	0
5	Liver with lingular process	14	28%
6	Liver with deep renal impressions and "corset" type constriction	1	2%
7	Liver with diaphragmatic impressions	6	12%
8	Liver with right lobe very much smaller than the left	1	2%
9	Liver with biliary vesicle invading the diaphragmatic face	0	0

Table 2 : Anthropometric data determined for human livers

Organ Type	Height(cm)	Diameter(cm)	Thickness(cm)	Weight (g)
1	14.41+2.48	18.59+1.59	9.77+1.53	1099.37+274.90
2	14.63+2.30	18.63+1.305	9.6+2.26	1153.33+266.89
3	10.4	17.2	7.4	690
4	-	-	-	-
5	14.40+1.95	18.41+2.95	10.812.41	1015.07+345.00
6	10.1	17.2	8.9	720
7	14.41+2.61	19.06+2.28	9.72+1.50	1210+326.3
8	8.6	16.5	5.2	430

Type-7 (diaphragmatic impression) found in 12 % cases which double than found by Nagato et al[4] in 6.57% cases.

Majority of the diaphragmatic sulci had been frequently detected during radiological investigations[5]. The diaphragmatic sulci is located on the diaphragmatic surface of the liver. Diaphragmatic sulci that are observed during autopsy studies is due to the pressure exerted by the ribs and the diaphragm, and which is usually located on the superficial surface of the liver 6. Auh Y H et al[5] reported that the accessory fissures on the liver are due to invagination of the liver by the diaphragm. They resemble the major hepatic fissure on sectional images. which make it more difficult to interpret. . Auh Y H et al[5] reported, that only 25% cases may be detected on any CT scan, and often it may be mistaken as a pathological nodule of the liver[5].

Type 8 found in 2% cases I present studies somewhat similar to than found by Nagato et al[4] 1.64%. type 8 mean left lobe very much larger than right lobe may result from pathological process in patient suffering with schistosomiasis (bezerra et al[6]) Some case found liver anomalies associated with malformation of other organ. Notched liver associated with subhepatic caecum and appendix[7,8] Bifid liver associated with diaphragmatic hernia.[9]

Conclusion: In this study mention the occurrence of morphological variations on the liver surface. The findings of the study very important for radiologist and surgeons, so they can avoid possible errors in interpretations and subsequent misdiagnosis and can planned appropriate surgical approaches.

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