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Pons Hepatis: An Anatomic Curiosity.

Kalamutharasi R^{1*}, Dhanalakshmi V², and Saranya G³.

¹Assistant Professor, Department of Anatomy, Government Thoothukudi Medical College, Thoothukudi, Tamilnadu, India.

²Associate Professor, Department of Anatomy, Government Thoothukudi Medical College, Thoothukudi, Tamilnadu, India.

³Assistant Professor, Department of Anatomy, Government Thoothukudi Medical College, Thoothukudi, Tamilnadu, India.

ABSTRACT

Pons hepatis is a bridge of liver parenchyma over the fissure for ligamentum teres. It connects Couinaud segments III and IV. Its incidence varies widely between different population groups. It can be a harboring site for disseminated peritoneal metastasis. The study was conducted in the Department of Anatomy, Govt. Thoothukudi Medical College, Tamilnadu, India from 50 formalin fixed liver specimens. The specimens were observed for the presence of pons hepatis and its completeness. The thickness of the pons hepatis was measured using Vernier caliper. 6 specimens had pons hepatis. Pons hepatis completely bridged the fissure in 3 specimens and was incomplete in 2 specimens. It was found to be membranous in 1 specimen. The average thickness of the pons hepatis was 3.01mm. The vascular pattern and biliary drainage of pons hepatis needs further exploration and it remains a keystone in cryoreductive surgery.

Keywords: Ligamentum teres, Liver, Pons hepatis, Quadrate lobe, Umbilical fissure

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**Corresponding author*

INTRODUCTION

Although variations in the size and shape of the liver are common, real anomalies are apparently quite infrequent. One such variation which is significant is the presence of pons hepatis. The pons hepatis is a variant, where the umbilical fissure which is a long, narrow groove that receives the ligamentum teres hepatis is converted into a tunnel by an overlying bridge of liver parenchyma extending between the Couinaud segments III and IV of liver [1].

MATERIALS AND METHODS

The study was carried out in 50 formalin fixed specimens from the Department of Anatomy, Govt. Thoothukudi Medical College, Tamilnadu, India. The liver specimens were removed from adult human cadavers during routine dissection for undergraduate medical students and then preserved in 10% formalin. The specimens were observed for the presence of bridging tissue between left lobe of liver and quadrate lobe. In the liver specimens with pons hepatis, it was observed for its completeness, nature of the tissue and its thickness. The thickness of the pons hepatis was measured using Vernier calipers.

RESULTS

Pons hepatis was present in 6 (12%) specimens (Fig .1). The fissure was completely bridged by pons hepatis in 3 specimens. It was bridging the middle of the fissure in 1 specimen and in another specimen, it was present in the posterior part of the fissure. Pons hepatis was found to be membranous in 1 specimen. The average thickness of the pons hepatis was 3.01mm.

Figure 1: Pons hepatis



Figure 2: Pons hepatis bridging the posterior part of the fissure



Table 1: Incidence of Pons hepatis

S. No	Author	Incidence
1	Cawich, S.O et al [3]	40.9%
2	Simi C. P et al [5]	9.5%
3	Anbumani L et al [6]	13.3%
4	Singh H.R & Rabi S [7]	22.8
5	Patil Deepak A et al [8]	1.25%
6	Justin Chin et al [9]	36%
7	Mohini M. Joshi et al [10]	13%
8	Seethamsetty Saritha et al [11]	4%
9	Khedekar and Hattangdi [12]	14%

DISCUSSION

First described by von Haller in 1743, the pons hepatis (hepatic bridge or „pont hepatic“) is a segment of hepatic tissue connecting the quadrate lobe to left lobe over the ligamentum teres fissure [2]. Global prevalence is 3.45% [3]. Chaudhari HJ et al have observed pons hepatis in 1(1.25%) specimen out of 80 liver specimens studied [4].

Shamir O. Cawich et al have reported two variants of pons hepatis, an open-type (incomplete) in which the umbilical fissure was incompletely covered by parenchyma ≤ 2 cm in length and a closed type (complete) in which the umbilical fissure was covered by a parenchymal bridge > 2 cm and thus converted into a tunnel [3]. From embryological point of view, in the human embryo, the umbilical vein was within the parenchyma of the liver. In the later stages it became extrahepatic. The parenchymal bridge uniting quadrate and left lobes over the umbilical sulcus was explained as a persistence of the embryonic liver [13].

Clinically, metastatic hepatomas have been found originating from the pons hepatis as well as harboring site of peritoneal disseminated tumor cells [14]. In cases of the pons hepatis bridging the fissure for ligamentum teres, normal visualization of the fissure would not be possible and dimensions of the right and the left lobes may be mistaken [8]. Pons hepatis obscures this fissure resulting in unclear separation of left and right anatomical lobes. Because of this, the surgeon may face difficulty in lobectomy operations. Also, the radiologist would not be able to properly demarcate the extent of an intrahepatic mass [15]. It is also an important site and landmark for cytoreductive surgeries of the liver [16].

CONCLUSION

A sound knowledge of the normal and variant liver anatomy is a prerequisite to having a favorable surgical outcome and commonly occurring variations assume even more significance in the era of diagnostic imaging and minimally invasive surgical approaches. Hepatic surface variations are common and must be taken into the differential diagnosis by radiologists and gastroenterologists.

REFERENCES

- [1] Susan Stand ring. Gray"s Anatomy: The Anatomical Basis of Clinical Practice.40th ed. New York: Churchill Livingstone Elsevier; 2008; 1166.
- [2] Reddy Namrata, S Joshi, S Mittal, Joshi, Subhash. Morphology Of Caudate and Quadrate Lobes of Liver. Journal of Evolution of Medical and Dental Sciences 2017; 6:897-901.
- [3] Cawich SO, Gardner MT, Shetty R. et al. Human liver umbilical fissure variants: pons hepatis (ligamentum teres tunnel). Surg Radiol Anat 2021; 43:795– 803.
- [4] Chaudhari HJ, Ravat2 MK, Vaniya VH, Bhedi AN. Morphological Study of Human Liver and Its Surgical Importance. J Clin of Diagn Res 2017; 11(6):AC09-AC12.
- [5] Simi CP, et al. International Journal of Trend in Scientific Research and Development 2020;4(2):107-109.
- [6] Anbumani L, Pavazhakkurinji TN, Thamaraiselvi A. Morphological study on variation of external surface of liver. Int J Anat Res 2020;8(2.2):7481–7485.
- [7] Haobam Rajajee Singh, Suganthy Rabi, Study of morphological variations of liver in human. Translational Research in Anatomy 2019; 14:1-5.

- [8] Patil Deepak A, Katti Anupama S. The Study of Morphological Variations of Liver in Human Cadavers. *Indian Journal of Anatomy* 2018;7(6):600-604.
- [9] Justin Chin, et al. Hepatic morphology: variations and its clinical importance. *Eur J Anat* 2018;22(3): 195-201.
- [10] Mohini M Joshi, Sushama K Chavan. Morphological Study of Adult Human Cadaveric Liver, *Int J Anat Res* 2017;5(3.2):4284-89.
- [11] Seethamsetty Saritha, et al. A Spectrum of Morphological Variations in the human liver lobes and its Clinical importance; a Cadaveric Study. *JMSCR* 2016;4(1):8818-8827.
- [12] Khedekar, Deepak N and Shanta Sunil Hattangdi. Some interesting morphological features of liver lobes in Mumbai population. *International Journal of Medical Research and Health Sciences* 2014; 3:656-659.
- [13] Baris Ozgur Donmez, Levant Sarikcioglu, Guzide Gokhan, Gul sum Özlem Elpek, Yasar Ucar. Pons hepatis: Report of two cases. *Acta Gastro-Entero logica Belgica* 2009; LXXII.
- [14] Onitsuka A, Katagiri Y, Miyauchi T, Shimamoto T, MI moto H, Ozeki Y. Metastatic hepatoma originating from the pons hepatis presenting extrahepatic growth-classification of different patterns covering REX's recesses. *Hepatogastroenterology* 2003;50(49):235-7.
- [15] Pooja Diwani, Krishna Patil, Mahendra Ambadasji Kat hole, Mangala Kohli. Morphological Study of Human Cadaveric Liver and its Surgical Significance. *International Journal of Anatomy Radiology and Surgery* 2021;10(2): A013-A015.
- [16] Sugar baker, Paul. Pont hepatic (hepatic bridge), an important anatomic structure in cytoreductive surgery. *Journal of surgical oncology* 2010;101:251-2.