

Pons Hepatis – An Anatomic Curiosity

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

²Dr. Dhanalakshmi V, Professor, Department of Anatomy, Government Thoothukudi Medical College, Thoothukudi, Tamilnadu, India.

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

⁴Dr. Ganga N V, Assistant Professor, Department of Anatomy, Government Thoothukudi Medical College, Thoothukudi, Tamilnadu, India.

Corresponding Author: Dr. Kalamutharasi R, Assistant Professor, Department of Anatomy, Government Thoothukudi Medical College, Thoothukudi, Tamilnadu, India.

How to citation this article: Dr. Kalamutharasi R, Dr. Dhanalakshmi V, Dr. Saranya G, Dr. Ganga N V, “Pons Hepatis – An Anatomic Curiosity”, IJMACR-January - 2023, Volume – 6, Issue - 1, P. No. 659 - 662.

Open Access Article: © 2023, Dr. Kalamutharasi R, et al. This is an open access journal and article distributed under the terms of the creative commons attribution license (<http://creativecommons.org/licenses/by/4.0>). Which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Introduction: 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.

Materials and Methods: 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 calipers.

Results: 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.

Conclusion: 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

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.



Fig 1: Pons hepatis (yellow arrow)



Fig2: Pons hepatis bridging the posterior part of the fissure (yellow arrow)

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].

| 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% |

Table1: Incidence of Pons hepatis

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 cryoreductive 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. (2017). Morphology Of Caudate and Quadrate Lobes of Liver. Journal of Evolution of Medical and Dental Sciences. 6. 897-901.
3. Cawich, S.O., Gardner, M.T., Shetty, R. et al. Human liver umbilical fissure variants: pons hepatis (ligamentum teres tunnel). Surg Radiol Anat 43, 795–803 (2021).
4. Chaudhari HJ, Ravat MK, Vaniya VH, Bhedi AN. Morphological Study of Human Liver and Its Surgical Importance. J Clin of Diagn Res. 2017; 11(6).
5. Dr. Simi. C. P, Dr. Uma B. Gopal, Dr. Surendra Chaudhary, Dr. Muteebanaz, Dr. Daiarisa Rymbai, Dr. Manu Krishnan "Pons Hepatis of Quadrate Lobe- A Morphological Variation of Liver" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-4 | Issue-2, February 2020, pp.107-109.
6. Anbumani L, Pavazhakkurinji TN, Thamaraiselvi A (2020) Morphological study on variation of external surface of liver. Int J Anat Res 8(2.2):7481–7485.
7. Haobam Rajajee Singh, Suganthy Rabi, Study of morphological variations of liver in human, Translational Research in Anatomy, Volume 14, 2019, Pages 1-5.
8. Patil Deepak A.1, Katti Anupama S.2, The Study of Morphological Variations of Liver in Human Cadavers, Indian Journal of Anatomy Volume 7 Number 6, November December 2018.
9. Justin Chin, Patrick O'Toole, Jun Lin, Sumathi Atha S. Vela an, Hepatic morphology: variations and its

clinical importance, Eur. J. Anat. 22 (3): 195-201 (2018).

10. Mohini M.Joshi, Sushama K. Chavan, Morphological Study of Adult Human Cadaveric Liver, Int J Anat Res 2017, Vol 5(3.2):4284-89.

11. Seethamsetty Saritha & Pandurang am, Gayathri & Anjum, Asra & Himabindu, N. (2016). A Spectrum of Morphological Variations in the human liver lobes and its Clinical importance; a Cadaveric Study. Khedekar, Deepak & Hattangdi, Shanta. (2014). Some interesting morphological features of liver lobes in Mumbai population. International Journal of Medical Research & Health Sciences. 3. 656. 10.5958/2319-5886.2014.00413.5.

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 3 (2014): 656-659.

13. Baris Ozgur Donmez¹, Levant Sarikcioglu¹, Guzide Gokhan², Gul sum Özlem Elpek², Yasar Ucar¹. Pons hepatitis: Report of two cases. Acta Gastro-Enterologica Belgica, Vol. LXXII, April-June 2009.

14. Onitsuka A, Katagiri Y, Miyauchi T, Shimamoto T, MI moto H, Ozeki Y. Metastatic hepatoma originating from the pons hepatitis presenting extrahepatic growth--classification of different patterns covering REX's recesses. Hepatogastroenterology. 2003 Jan-Feb;50(49):235-7. PMID: 12630030.

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 Apr, Vol-10(2).

16. Sugar baker, Paul. (2010). Pont hepatic (hepatic bridge), an important anatomic structure in cytoreductive

surgery. Journal of surgical oncology. 101. 251-2. 10.1002/jso.21478.