

A Case of Ultrasound-Guided Intervention Therapy for a Beaver Tail Liver with Hepatic Abscess

Ziwei Zheng, Can Liu

Department of Ultrasound, The First Affiliated Hospital of Yangtze University, Jingzhou, China
Email: 1069820895@qq.com

How to cite this paper: Zheng, Z.W. and Liu, C. (2023) A Case of Ultrasound-Guided Intervention Therapy for a Beaver Tail Liver with Hepatic Abscess. *Yangtze Medicine*, 7, 191-196.

<https://doi.org/10.4236/ym.2023.74020>

Received: November 15, 2023

Accepted: December 17, 2023

Published: December 20, 2023

Copyright © 2023 by author(s) and Scientific Research Publishing Inc.
This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

Objective: To report a case of beaver tail liver accidentally discovered by preoperative examination, and review relevant literature to improve the understanding of the anatomical variation of the liver. **Methods:** Analysis of a case of beaver tail liver incidentally discovered during preoperative examination for hepatic abscess in our hospital in June 2023. Combining domestic and foreign literature, the etiology, clinical manifestations, diagnosis, differential diagnosis, and treatment of beaver tail liver are discussed. **Results:** The patient was admitted due to abdominal pain and fever, with no other specific discomfort. An incidental finding of a beaver tail liver was discovered during imaging examinations. **Conclusion:** The beaver tail liver is a variant in hepatic anatomical morphology with nonspecific clinical manifestations. It is often incidentally discovered through imaging examinations such as ultrasound, CT, or MRI. Treatment is only necessary when the beaver tail liver is associated with hepatitis or tumors; otherwise, it does not require specific treatment.

Keywords

Beaver Tail Liver, Hepatic Abscess

1. Introduction

“Beaver tail liver” is a type of anatomical variation in the liver. After birth, the posterior part of the left hepatic lobe gradually regresses, and the remaining remnants are referred to as the hepatic fibrous appendix or hepatic fibrous tag. Within it, there may be a small amount of liver tissue and wandering hepatic ducts. If there is still intact liver tissue inside, it forms the liver lobe known as the

beaver tail liver. It is characterized by the extension and bending of the left outer edge of the liver towards the left rear, with the tip surpassing the mid-axillary line, partially surrounding the spleen. Its morphology resembles the tail of a beaver, hence the name 'beaver tail liver'. [1]. Previous studies have mainly focused on the anatomy and differential diagnosis of a beaver tail liver. The beaver tail liver is often misdiagnosed due to similarities in sonograms with conditions such as liver cirrhosis, splenic remnants, and perisplenic hematoma. However, cases of a docked liver accompanied by a hepatic abscess are rare. We present a clinical case of a beaver tail liver with a concurrent hepatic abscess that was accidental discovered, and discuss its differential diagnosis.

2. Case Presentation

A 71-year-old female patient presented with a chief complaint of abdominal pain and fever for one day. After initially seeking medical attention at the local health center, she is now admitted to our hospital for further evaluation and treatment. The patient has a history of surgery for varicose veins in the right lower limb and denies any history of hypertension, diabetes, cardiac or cerebrovascular diseases, mental health disorders, or trauma. There is no reported history of medication or food allergies. During physical examination, the patient's examination revealed clear consciousness, voluntary positioning, and cooperative behavior. Skin and mucous membranes showed no signs of jaundice, and no palpable superficial lymph nodes were detected. There were no vascular murmurs in bilateral neck arteries, and lung sounds were clear without apparent dry or moist rales. The heart had a normal size with regular rhythm and no murmurs. Abdominal examination revealed distension, soft texture, generalized tenderness, and rebound tenderness. Bowel sounds were present, and the liver and spleen were not palpable below the ribcage. No edema was noted in the lower limbs. Routine blood tests showed an elevated total white blood cell count of $18.91 \times 10^9/L$. Preoperative CT findings indicated the extension of the left outer lobe of the liver, partially encircling the spleen, forming a beaver tail liver. The liver S2 segment showed an ischemic lesion with a suspected infectious or alternative etiology, and cholecystitis was considered (**Figure 1**). The ultrasound examination initially did not reveal any liver lesions. On the following day, a repeat ultrasound identified a lesion in the S2 segment, raising suspicion of an infectious lesion in the S2 segment. Combining various examinations, we diagnosed it as a beaver tail liver with hepatic abscess. Further treatment involved ultrasound-guided liver abscess drainage and contrast-enhanced ultrasound. The contrast-enhanced ultrasound indicated a non-perfused lesion, confirming it as a hepatic abscess. Subsequent drainage placement within the abscess resulted in the extraction of purulent fluid (**Figure 2**), leading to a significant reduction in the size of the lesion after drainage. Postoperatively, the patient experienced noticeable improvement in abdominal pain, a significant decrease in inflammatory markers, and a gradual return to normal body temperature. A follow-up abdominal CT one day after the procedure revealed a significant reduction in the

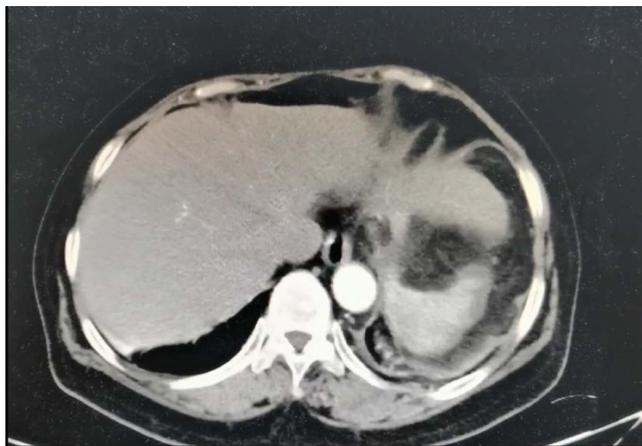


Figure 1. Preoperative CT images: the lesion located in the S2 segment of the liver is displayed.

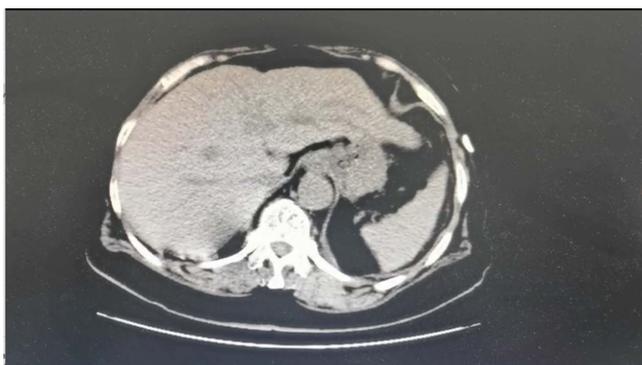


Figure 2. Postoperative CT images: the lesion in the S2 segment has significantly reduced in size.



Figure 3. Images during ultrasound-guided catheter drainage procedure.

infectious focus (**Figure 3**), consistent with the findings from ultrasound. Finally, a three-dimensional reconstruction of the liver clearly showed the leftward extension of the liver's left margin, partially surrounding the spleen, providing more favorable evidence for the diagnosis of a docked liver (**Figure 4**). On the

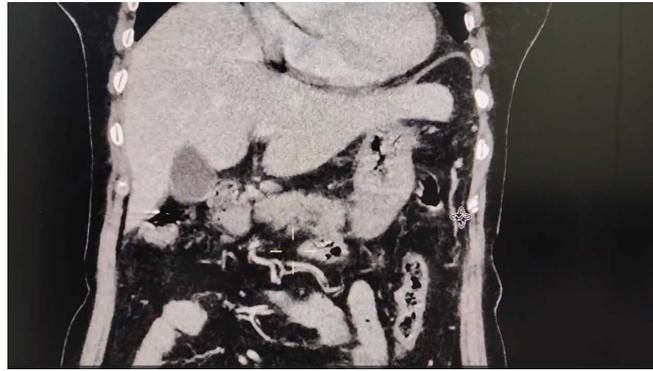


Figure 4. Three-dimensional reconstructed images of the beaver tail liver. Clearly showing the course of the left hepatic lobe.

third postoperative day, the patient was free of any discomfort, with normal inflammatory markers, and the patient was discharged after the removal of the drainage tube.

3. Discussion

The beaver tail liver is a congenital variation of the liver, where in the fetal stage, the liver's nutrition is supplied through the umbilical vein. The umbilical vein, at the division between the left lobes, naturally curves to the right to connect with the portal vein, nourishing both the left and right liver lobes. After birth, the liver's nutrition is supported by the hepatic artery and portal vein, as the umbilical vein closes. The intrahepatic vessels undergo fusion and degeneration, reducing in number. The main angle between the portal vein trunk and its left branch becomes acute, resulting in less vascular supply and developmental growth to the left lobe compared to the right lobe. The posterior part of the left outer lobe gradually degenerates, leaving remnants known as the hepatic fibrous appendix or hepatic fibrous appendage. Within these remnants, there may be a small amount of liver tissue and stray hepatic ducts. If there is still intact liver tissue within these remnants, it forms the liver lobe known as the beaver tail liver, observed in approximately 5% of adults [2].

The beaver tail liver often presents with nonspecific clinical symptoms and is typically discovered through physical examinations or relevant investigations when combined with other diseases. The diagnostic key points include [3]: 1) Extension and bending of the left outer edge of the liver to the left and posterior, with the tip surpassing the midaxillary line; 2) The extended portion of liver tissue is connected to the normal left outer lobe vessels, exhibiting similar density and signal intensity on plain and enhanced scans compared to the rest of the liver tissue; 3) The left lobe fissure is located to the right of the vertebral body edge (indicating that the beaver tail liver is only related to the left outer lobe rather than the entire left liver lobe enlargement); 4) The connection point of the extended portion with the left outer lobe may be relatively narrow. Among these four diagnostic criteria, 1), 2), and 3) are essential conditions, and 4) is an aux-

iliary condition [4]. The diagnosis of the beaver tail liver mainly relies on the combination of CT, MRI, and ultrasound from multiple perspectives, especially the three-dimensional reconstruction of CT, which can clearly display the surrounding anatomical structures and differentiate it from other diseases.

The beaver tail liver often needs to be differentiated from liver cirrhosis, residual spleen, compensatory enlargement of the accessory spleen, lobulated spleen, splenic tumors, and perisplenic hematoma. 1) Liver enlargement caused by cirrhosis is generally uniform, with no relative narrowness, posterior bending, or encircling of the spleen. Cirrhosis patients also exhibit morphological abnormalities such as widened liver fissures, pseudo-lobule formation, and cirrhotic nodules due to hepatocyte necrosis, collapse of the lobular structure, and diffuse proliferation of fibrous tissue. Advanced cirrhosis can manifest as functional impairment, jaundice, abnormal coagulation function, and complications like esophageal-gastric varices, splenomegaly, splenic hyperfunction, and ascites due to increased portal vein pressure, hindrance of venous return from the gastrointestinal tract and spleen, leading to the opening of collateral circulation [5]. 2) The differentiation of the beaver tail liver from residual spleen and compensatory enlargement of the accessory spleen: Residual spleen usually has a history of splenectomy, and its existence is discovered through relevant imaging examinations postoperatively. Compensatory enlargement of the accessory spleen appears as increased parenchyma within the accessory spleen, presenting as round or oval nodular changes [6]. 3) Clinical cases of splenic tumors are extremely rare, with a low reported incidence in domestic and foreign literature. They exhibit complex pathological classifications, with benign tumors being more common than malignant ones. Splenic tumors typically lack specific clinical manifestations and are often incidentally discovered through imaging examinations. They generally present as round, oval, or irregular-shaped masses within the splenic parenchyma, and secondary splenic tumors are associated with a history of tumors in other parts of the body and are mostly malignant. 4) Lobulated spleen is a developmental anomaly, with each lobe receiving blood supply from the splenic artery, and the parenchymal echoes between the lobes are consistent. 5) Perisplenic hematoma is usually associated with a history of upper abdominal trauma, and imaging examinations reveal crescent or beaver tail-like changes around the spleen. However, there is no obvious blood flow signal within the hematoma, and it is not connected to the left liver. When a beaver tail liver is combined with a hepatic abscess, it is prone to misdiagnosing the lesion. In this case, our ultrasound doctor did not initially detect the liver abscess lesion during the first examination. This was because the left outer lobe of the beaver tail liver extends posteriorly to the front of the spleen, causing what was observed during the initial scan as not being the actual left margin of the liver. It was only after expanding the scanning range during the second examination that the lesion was found. When a beaver tail liver is combined with a liver abscess, especially in the S2 segment, ultrasound doctors should conduct a more com-

prehensive scan to ensure that the scanning range covers the entire liver, avoiding misdiagnosis.

In summary, the beaver tail liver is a congenital anatomical variation in the liver's morphology. It is often incidentally discovered through imaging examinations, typically lacks specific clinical manifestations, and poses no harm to the body. Treatment is only necessary if the beaver tail liver is associated with hepatitis or tumors. On its own, it does not require specific medical intervention. Ultrasound examination can accurately diagnose the presence of beaver tail liver and other associated lesions. This relies on the doctor's experience in promptly recognizing the presence of beaver tail liver and conducting a comprehensive scan of the liver.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] Wang, Y.C., Wang, Y.J., Song, X., *et al.* (2015) Ultrasound Diagnosis and Differential Diagnosis of Beaver Tail Liver. *Contemporary Medicine*, **21**, 74-75.
- [2] Zhang, G.L., Ji, S.N. and An, F.X. (2010) CT and MRI Diagnosis of Beaver Tail Liver (with an Analysis of 40 Cases). *Journal of Medical Imaging*, **20**, 1217-1218.
- [3] Atalar, M.H. and Karakus, K. (2018) Beaver Tail Liver. *Abdominal Radiology*, **43**, 1851-1852. <https://doi.org/10.1007/s00261-017-1395-x>
- [4] Guo, Z.T., Li, S.S., Teng, Y.S., *et al.* (2020) A Case of Beaver Tail Liver and Literature Review. *Chinese Medicine Science*, **10**, 254-256.
- [5] Lin, Y., Zeng, X. and Hu, P.F. (2023) Consensus on the Clinical Diagnosis and Treatment of Cirrhosis in China. *Journal of Clinical Hepatology*, **39**, 2057-2073.
- [6] Su, S.N. and Jiang, C.H. (2020) Experience in Ultrasound Examination of Accessory Spleen. *Baotou Medical*, **44**, 36-38.