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Case Report

Beaver tail liver: an anatomical variant

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ABSTRACT

Beaver tail liver, is a rare anatomical variation in which the left hepatic lobe extends laterally to encircle the spleen. This variant is typically asymptomatic and is often discovered incidentally during abdominal imaging. While it does not impair liver function, it presents diagnostic challenges and potential clinical implications, including misinterpretation as a splenic mass or hematoma. We report the case of a 20-year-old female who presented to the emergency department with a high-grade fever, headache, right-sided limb weakness, and aphasia. Imaging studies revealed subdural empyema with pachymeningitis. A contrast-enhanced CT of the abdomen was performed to investigate potential extrapulmonary tuberculosis and incidentally identified an elongated left hepatic lobe encircling the anterior border of the spleen, confirming a diagnosis of beaver tail liver. This case highlights the importance of recognizing beaver tail liver as a benign anatomical variant to avoid unnecessary interventions. Awareness of its implications in trauma assessment, surgery, and transplantation is essential for optimal patient management.

Keywords: Beaver tail liver, Anatomical variation, Incidental finding

INTRODUCTION

Beaver tail liver, also known as sliver of liver, saber-shaped liver, or flax-like liver, is a rare anatomical variation in liver morphology. In this condition, the left lobe of the liver may elongate and extend laterally across the midline, making contact with and often encircling the anterior portion of the spleen. This variant is uncommon and tends to occur more frequently in females.[1] The extension of the left hepatic lobe is composed of normal hepatic parenchyma. Beaver tail liver is typically discovered incidentally during abdominal imaging and it does not result in any functional impairment of the liver.[2]

Distinguishing between the liver and spleen can be challenging when their CT densities or ultrasound echogenicities are identical. Even when there are differences in these characteristics, they may still be misinterpreted as a splenic mass or a hematoma in the peri-splenic or subcapsular region.[3]

This report describes a case of beaver tail liver identified during a routine abdominal imaging examination, highlighting its distinctive characteristics, diagnostic challenges, and relevance to clinical practice.

CASE REPORT

A 20-year old female came to the emergency medical department at SVP IMSR with complaints of headache that was holocranial in nature, high grade fever with chills and rigor for a few days, followed by weakness of right upper limb and right lower limb along with aphasia. The patient had no notable medical history of trauma, seizures and facial deviation. The patient had no other comorbidities. On admission, the patient presented with a temperature of

102.0 F, heart rate of 114 beats per minute, blood pressure of 120/74 mmHg, respiratory rate of 20 breaths per minute and SpO_2 of 98% of ambient room air.

Laboratory investigations on the day of admission showed elevated levels of white blood cell count, C-reactive protein, prothrombin time and international nationalised ratio. Next, imaging studies like MRI of Brain with contrast, CT scan of paranasal sinuses and MRI of brain with venogram contrast revealed diagnosis of subdural empyema with pachymeningitis.

Subsequently, contrast enhanced CT abdomen was done to find out the etiology and to rule out the possibility of extra pulmonary tuberculosis and possible spread into the central nervous system.

Figure 1: Coronal contrast enhanced CT image showing elongated left liver lobe in close contact with spleen.

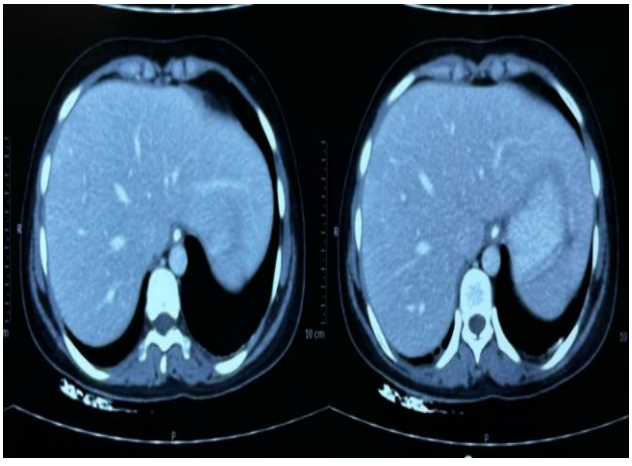

Figure 2: Axial contrast enhanced CT image showing elongated left liver lobe extending laterally and encircling spleen.

Incidentally, on the CT scan, her liver was found to be elongated in which the left lobe of liver was extending laterally up to the spleen and encircling its anterior border. This anatomic variation of liver is known as "beaver tail liver".

The patient was treated with intravenous antibiotics for 14 days, after which the subdural empyema resolved. The patient showed significant clinical improvement and was subsequently discharged in stable condition. Given that beaver tail liver was an incidental finding in this patient, with no associated symptoms or clinical impact, no further evaluation or intervention regarding it was pursued.

DISCUSSION

Accessory liver lobes are a rare condition that occur due to excessive development of liver and are often diagnosed incidentally. There are many variants of these but the best-known example of an accessory lobe of liver is Riedel's lobe which is the hypertrophy of lobes V and VI. Accessory liver lobes are composed of normal liver parenchyma and are in continuity with the liver. Ectopic liver lobes are not in continuity with the liver and have variable size, form and localisation.[4]

Beaver liver is a variant that is often discovered incidentally during imaging tests. It is often asymptomatic or presents with non-specific findings like fever, tachycardia, tachypnea, hepatomegaly.

In beaver tail liver, the left lobe of the liver has normal hepatic parenchyma and does not affect liver function; but it can have serious clinical implications like

Trauma

Beaver tail liver has more chances of being injured during trauma to the upper left chest or abdomen.[5]

Surgical procedures

There are more chances of injury during surgical procedures of upper abdomen or adjacent structures.

Misdiagnosis

There are various differential diagnoses which need to be ruled out to diagnose Beaver tail liver as they can have similar presentation: which needs to be ruled out to diagnose Beaver tail liver as they can have similar presentation: liver cirrhosis, residual spleen, compensatory enlargement of the accessory spleen, lobulated spleen and splenic tumours.[6,7]

Misinterpretation during trauma assessment in a patient

Sometimes in a trauma patient, FAST (Focused Assessment with sonography for trauma) scan which is crucial for diagnosing blunt abdominal trauma, has misinterpreted beaver liver as splenic subcapsular hematoma leading to more invasive management. In an

unusual presentation, it resembled an organised haematoma during coronary artery bypass graft surgery (CABG).[8]

In right lobe liver donor candidates, left lobe volume percentage is important in the development of postoperative complications. Considering that the liver remnant volume should be at least 30% after transplantation, any value below this limit has life-threatening consequences for a right lobe donor. In patients with beaver tail liver, left lobe volume percentage is higher than those with normal liver. In conclusion, selecting living donors with the beaver tail feature in liver transplantation offers a safer option by ensuring a favourable left lobe to liver volume percentage. This feature may also positively influence the donor's postoperative recovery and help minimise complications.[9]

The diagnosis of a beaver tail liver primarily depends on the integration of CT, MRI, and ultrasound imaging from various angles, with three-dimensional CT reconstruction being particularly valuable for clearly visualising surrounding anatomical structures and distinguishing it from other conditions.[7]

This case presented a diagnostic challenge due to overlapping symptoms with subdural leptomeningitis which necessitated whole body imaging to rule out conditions like tuberculosis, and Beaver Liver was an incidental imaging finding in this patient.

CONCLUSION

Beaver tail liver is a rare anatomic hepatic variant that presents as an extension of the left hepatic lobe encircling the spleen. This case report highlights the rare and incidental occurrence of this variant and the unique challenges beaver tail liver can present. Knowledge of this variant is important to prevent misdiagnosis and misinterpretation in FAST and is also helpful in liver transplantation surgeries.

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