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INFECTIOUS AND INFLAMMATORY DISORDERS OF THE LIVER IN CHILDREN

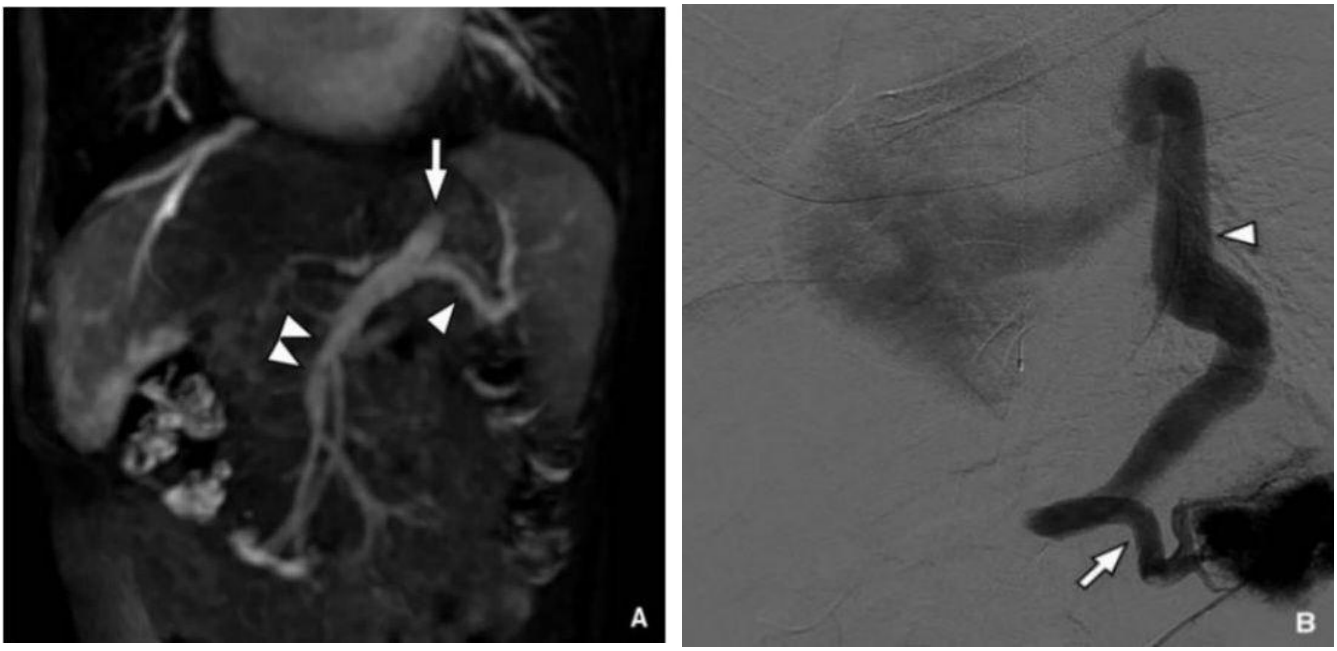
Annotation

This article summarizes the spectrum of pediatric infectious and inflammatory liver disorders, with emphasis on epidemiology, clinical presentation, and imaging findings. A comprehensive review of literature from PubMed, Scopus, and NCBI databases (2000–2025) was conducted, focusing on pediatric liver diseases, including viral hepatitis and neonatal cholestasis, their epidemiology, and imaging characteristics.

Key words

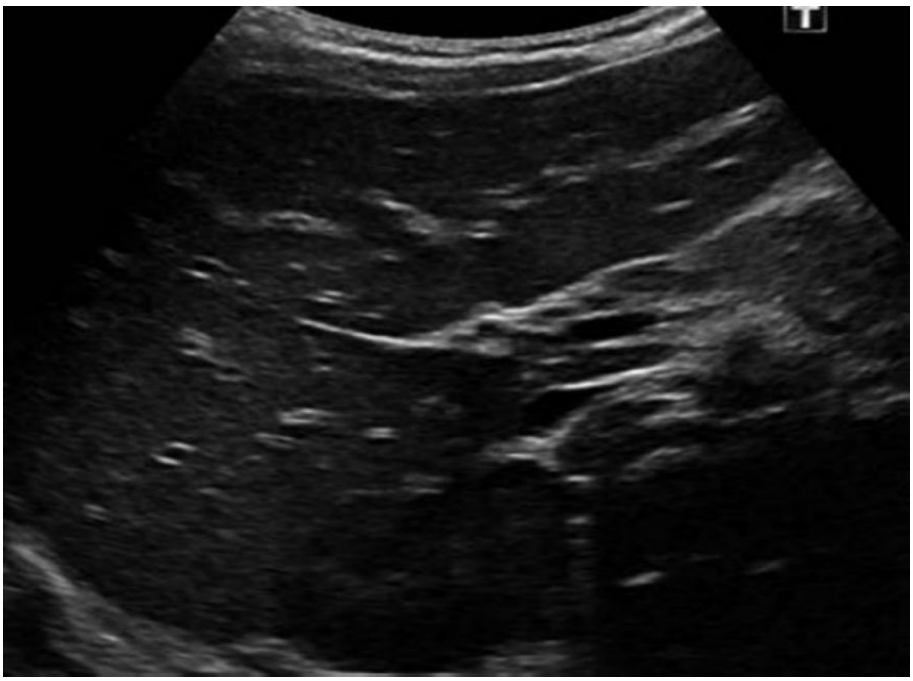
liver disorders,epidemiology, imaging findings, viral hepatitis, neonatal cholestasis

Introduction: Infectious diseases of the liver in children consist of viral hepatitis, pyogenic (bacterial) and amebic abscesses, parasitic diseases (e.g., hydatid disease and schistosomiasis), as well as fungal and other granulomatous diseases (e.g., tuberculosis, cat-scratch disease). Viral hepatitis outside of the neonatal period is most commonly caused by hepatitis A, B, and C viruses, but a vast array of other viruses can infect the liver in childhood, including coxsackie, rubella, Epstein-Barr, varicella–zoster, herpes simplex, adenovirus, and cytomegalovirus. The diagnosis of viral hepatitis is typically clinical. Ultrasound may show hepatomegaly, heterogeneous parenchymal echotexture, “starry sky” appearance (diffuse decrease in hepatic echogenicity with resultant relative increase in echogenicity of the portal vein walls), gallbladder wall thickening , and periportal lymph node enlargement. Chronic viral hepatitis conveys an increased risk of cirrhosis and resultant complications, such as portal hypertension and malignancy. Ultrasound is frequently used to screen for these complications.



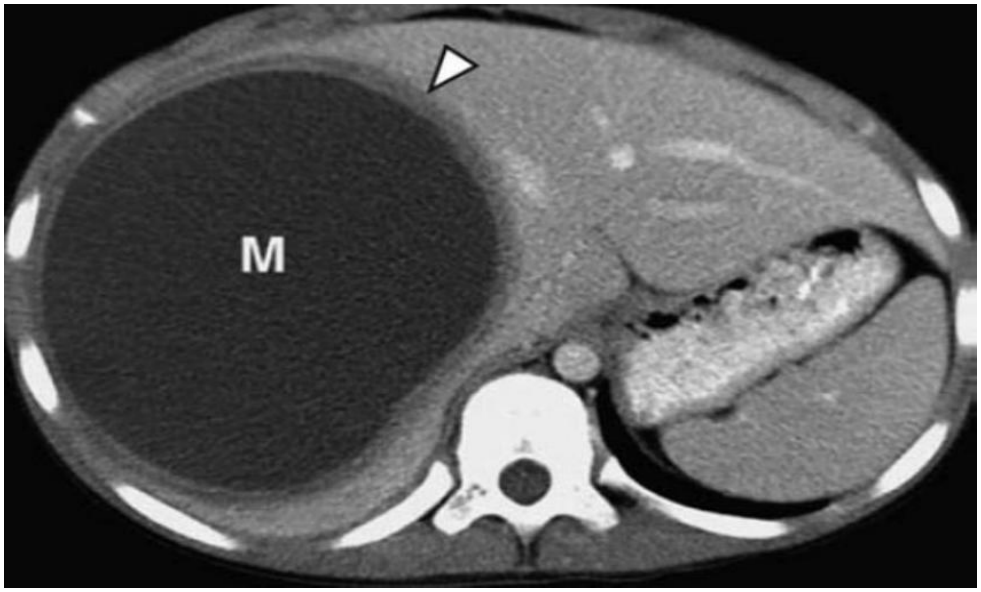
A 2-year-old boy with Abernethy malformation.

A: Postcontrast T1- weighted maximum-intensity projection (MIP) MR image shows that the superior mesenteric vein (double arrowhead) and the splenic vein (single arrowhead) join together and drain via a partially visualized shunt to the right atrium (arrow). There is no visible normal main portal vein. B: Left anterior oblique digital subtraction image from splenic portography shows a vascular blush in the spleen with contrast filling the splenic vein (arrow) and then draining via a large shunt (arrowhead) to the right atrium. There is no visible normal main portal vein.



A 16-year-old boy status post bone marrow transplant with viral hepatitis.

Transverse gray-scale ultrasound image shows classic “starry sky” appearance of the liver with diffusely decreased parenchymal echogenicity and relatively increased echogenicity of the portal vein walls.



Amebic abscess. *Axial contrast-enhanced CT image shows a large, low-attenuation mass (M) with a surrounding hypoattenuating rim of edema (arrowhead) in the right lobe of the liver.*

Fungal infections of the liver in children most frequently occur in immunocompromised patients, often those with neutropenia, and in patients with lymphoma/leukemia. Candida, Aspergillus, Histoplasma, Cryptococcus, Coccidioides, Nocardia, and Mucor are all known causative agents. Several ultrasound patterns of fungal microabscesses have been described: “wheel-within-a-wheel” pattern (central hypoechoic focus surrounded by echogenic rim), target appearance (central echogenic focus surrounded by hypoechoic rim), diffuse uniform hypoechoic foci, and finally, calcified, hyperechoic foci in the healing/healed phase . On CT, both with and without intravenous contrast material, fungal microabscesses present as multiple, small, hypoattenuating lesions scattered throughout the liver. On MRI, fungal microabscesses appear as multiple, small lesions that are hypointense on

T1-weighted MR images and hyperintense on T2-weighted MR images with

variable enhancement following intravenous contrast material administration.

Neonatal hepatitis refers to the clinical presentation of a neonate with conjugated hyperbilirubinemia related to underlying liver disease. 19 Hepatic inflammation does not need to be present but frequently is. Causes of the underlying liver disease are numerous, including infection (e.g., toxoplasmosis, rubella,

cytomegalovirus, herpes), metabolic (e.g., α-1-antitypsin deficiency), neoplastic,

vascular (e.g., Budd-Chiari syndrome), toxic (e.g., total parenteral nutrition

(TPN) - associated cholestasis, drug related), immune (i.e., gestational

alloimmune liver disease/neonatal hemochromatosis), structural (e.g., choledochal cyst), and idiopathic. The role of imaging in neonatal hepatitis is not necessarily to identify the exact etiology of the hepatitis but rather to confirm the diagnosis, exclude extrahepatic biliary atresia, and identify structural abnormalities. Ultrasound is typically the initial imaging modality of choice in this scenario. On ultrasound, the liver may be normal in appearance, although hepatomegaly and increased parenchymal echogenicity may be seen. It is important to identify features of biliary atresia, as this condition requires urgent surgical intervention.

Magnetic resonance cholangiopancreatography (MRCP) and hepatobiliary

scintigraphy can also be used in the evaluation of a patient with neonatal

hepatitis. Visualization of the extrahepatic bile ducts by MRCP has a sensitivity

and specificity of 90% and 77%, respectively, for excluding biliary atresia. 20 On

hepatobiliary scintigraphy using a 99 m Tc-labeled iminodiacetic acid (IDA)

analogue, imaging features consistent with neonatal hepatitis include delayed

hepatocyte uptake and washout of the radiotracer with identifiable bowel

activity. Delayed images at 4 to 6 and 24 hours should be performed to confirm

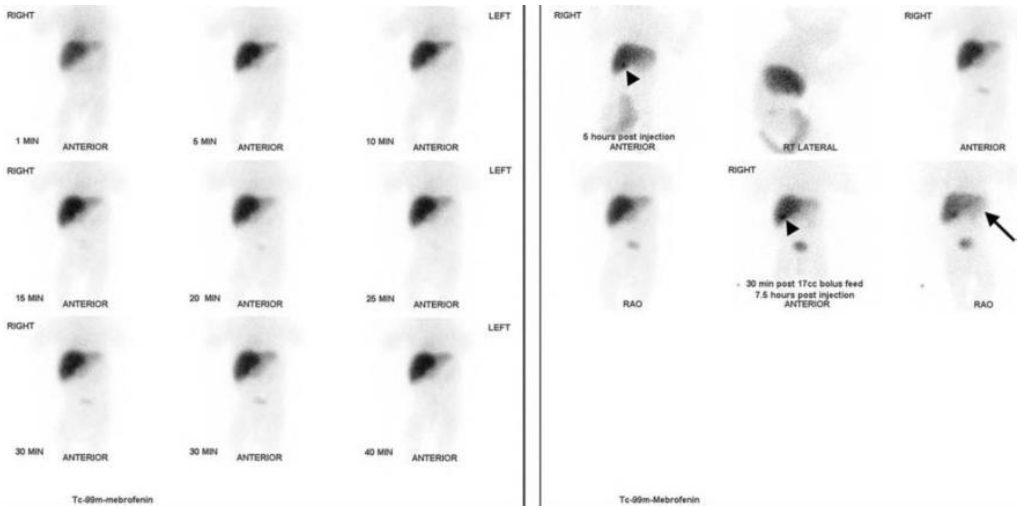
the presence of excreted radiotracer in the bowel . Hepatobiliary

scintigraphy with single photon emission computed tomography (SPECT) was

recently shown to have an accuracy of 91.3% in this clinical scenario. 21

Ultimately, liver biopsy is often required to add in differentiating neonatal

hepatitis from biliary atresia.



A 6-week-old boy with neonatal hepatitis.

Hepatobiliary scan with 99m Tc-mebrofenin demonstrates delayed washout of radiotracer from the liver with some accumulation in the gallbladder (arrowheads). There is eventual subtle radiotracer accumulation in bowel (arrow) on the 7.5-hour postinjection images that eliminates biliary atresia as a diagnostic possibility. Excreted radiotracer in urine is visible in the patient's diaper on the 5 hour post-injection images.

Results: Pediatric liver disorders, both infectious and inflammatory, represent a significant cause of morbidity worldwide. Infectious liver diseases are among the most common pediatric liver disorders, with viral hepatitis being predominant. In a study conducted in North India, out of 2,232 samples collected from children with suspected viral hepatitis, 1,406 (63%) tested positive. Fecal–oral transmitted viral hepatitis accounted for 82.9% of cases, including hepatitis A virus (HAV) in 73.8% and hepatitis E virus (HEV) in 9.1%. Parenterally transmitted hepatitis represented 17.1% of cases, including hepatitis B virus (HBV) in 16.2% and hepatitis C virus (HCV) in 0.9%. Age distribution analysis demonstrated that HAV infection predominated in children aged 1–3 years, highlighting the impact of hygiene and sanitation conditions. Chronic HBV infection, although less frequent, carries a substantial risk of long-term complications, including cirrhosis and hepatocellular carcinoma.

Inflammatory liver disorders, including neonatal hepatitis and cholestasis, also constitute a significant portion of pediatric liver disease. According to data from the National Center for Biotechnology Information (NCBI), the incidence of neonatal cholestasis in North America is approximately 1 in 2,500 live births, with nearly 40% of cases attributed to fibrosing cholangiopathy, particularly biliary atresia. Comparable prevalence has been reported in Europe, emphasizing the substantial clinical burden of inflammatory liver disease in neonates. Although comprehensive global epidemiological data remain limited, these findings underscore the need for early diagnosis, timely intervention, and continued surveillance to prevent long-term complications.

Conclusion. Pediatric liver disorders, encompassing both infectious and inflammatory etiologies, represent a significant global health concern. Viral hepatitis remains the predominant infectious cause of liver disease in children, particularly in developing regions, where fecal–oral transmission of HAV and HEV is common. Although less prevalent, HBV and HCV infections carry a substantial risk of chronic liver disease, cirrhosis, and long-term complications.

Inflammatory liver conditions, including neonatal hepatitis and cholestasis, also contribute considerably to pediatric morbidity. With an incidence of approximately 1 in 2,500 live births in North America and a significant proportion attributable to biliary atresia, early recognition of neonatal cholestasis is critical.

Imaging modalities such as ultrasound, magnetic resonance cholangiopancreatography (MRCP), and hepatobiliary scintigraphy play a central role in diagnosis, differential evaluation, and management planning. Prompt identification of underlying pathology allows for timely intervention, particularly in surgically treatable conditions such as biliary atresia.

Overall, early diagnosis, appropriate imaging assessment, and region-specific preventive strategies are essential to reduce complications and improve clinical outcomes in children with infectious and inflammatory liver diseases.

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