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Research Article

The Role of Ultrasound in the Diagnosis of Liver Cirrhosis in the Medical Imaging Department at Mali Hospital

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Abstract

Cirrhosis is a serious, progressive disease and constitutes a public health problem. The objective of this study was to examine the role of ultrasound in the diagnosis of cirrhosis at the Hospital of Mali. This was a prospective cross-sectional study conducted from February 2024 to February 2025. The study included all patients admitted to the department for abdominal ultrasound as part of the diagnosis of liver cirrhosis. Data were analyzed using SPSS version 21.0. Patient participation was voluntary. Patient confidentiality and anonymity were guaranteed. We identified 121 cases of cirrhosis diagnosed among 3,142 abdominal ultrasounds performed, representing a prevalence of 3.85%. Male patients accounted for 70% of cases. The mean age was 51.34 ± 13.86 years. The predominant clinical symptom was abdominal pain in 89.3% of cases. Hepatomegaly with a sharp lower border was recorded in 80.88% of cases. On ultrasound, hepatomegaly was present in 55% of patients. The echogenicity of the liver was heterogeneous in 96.7% of cases. The liver margins were irregular in 73% of cases. Hepatic dysmorphism was present in 74% of cases. Nodules were present in 60% of patients, and portal vein dilation in 58.7% of patients. Cirrhosis remains a common and serious condition. Ultrasound is an essential tool for screening and diagnosis.

Keywords

Cirrhosis, Ultrasound Diagnosis, Medical Imaging, Mali Hospital

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1. Introduction

Cirrhosis is a chronic fibrotic liver disease characterized by the transformation of normal liver architecture through a diffuse process of concentric fibrosis that encases regenerative nodules [1]. There are many types of cirrhosis, including post-hepatitis, alcoholic, steatohepatitis associated with metabolic dysfunction, and mixed cirrhosis, as well as congestive, biliary, and parasitic cirrhosis. Its etiological factors and morbidity vary by geographic region [2].

Cirrhosis is a public health problem worldwide, particularly in Africa [3]. Its prevalence is estimated at 1% globally and ranges from 0.15% to 0.27% in the United States [4, 5]. In France, its incidence ranges from 150 to 200 cases per million inhabitants, with an estimated mortality rate of 1,500 per year [4, 5]. In Africa, the incidence of cirrhosis was 27.63% in Burkina Faso and 32.07% in Niger [6, 7]. In Mali, a recent study conducted in 2025 at the referral health center in Commune V reported a prevalence of 4.1% for cirrhosis [8].

Ultrasound is a noninvasive imaging method that uses ultrasound waves. It is the first-line method for screening for liver cirrhosis [9]. It allows for the assessment of morphology (shape and contours), echostructure (homogeneous, heterogeneous, nodular), and signs of portal hypertension (splenomegaly, shunts, flow abnormalities, and signs of thrombi) [10, 11]. According to a prospective study conducted among patients suspected of having cirrhosis who underwent a liver biopsy, ultrasound had a sensitivity of 91% and a specificity of 94% for diagnosis [12]. The definitive diagnosis of cirrhosis is histopathological examination of liver tissue obtained via biopsy or surgery [13].

This increase in the incidence of cirrhosis demonstrates that early diagnosis and follow-up of affected patients are essential for improving patient care. Among the available diagnostic tools, abdominal ultrasound plays a key role due to its accessibility, non-invasive nature, and relatively low cost. This study may help optimize the use of ultrasound in the early detection of cirrhosis and its complications. It is in this context that we initiated this work. The objective of this study was to examine the role of ultrasound in the diagnosis of cirrhosis in the Medical Imaging Department of the Hospital of Mali.

2. Patients and Methods

Our study was conducted in the Medical Imaging Department of Mali Hospital and the Hepatogastroenterology Department of Gabriel Touré University Hospital. It was a prospective cross-sectional study conducted from February 2024 to February 2025. The study included all patients admitted to this department for an abdominal ultrasound as part of the diagnosis of liver cirrhosis. Data were entered and analyzed using SPSS version 21.0. Patient participation was voluntary, and consent was obtained from the parents or guardians of patients under the age of 18. Patient confidentiality and anonymity were ensured.

Our study included all patients referred by the Hepatogastroenterology Department of Gabriel Touré University Hospital for whom a diagnosis of cirrhosis had been confirmed. Patients with conditions other than cirrhosis were excluded. Abdominal ultrasound was performed in the Medical Imaging Department.

The examinations were performed using a FUJIFILM ARIETTA 50 ultrasound machine equipped with four probes: a 1–5 MHz convex probe, a 5–13 MHz linear probe, a 2–10 MHz transvaginal probe, and a 1–5 MHz cardiac probe. The ultrasounds were performed by a radiologist a physician specializing in ultrasound.

3. Results

3.1. Frequency

We identified 121 cases of cirrhosis diagnosed among 3,142 abdominal ultrasounds performed, representing an incidence of 3.85%.

3.2. Socio-demographic Data

Table 1. *Distribution of patients according to socio-demographic data.*

Sociodemographic data	n=121	%
Gender		
Male	85	70
Female	36	30
Age group (years)		
41-50	29	24,0
51-60	30	24,8
Occupation		
Farmer	44	36,4
Houswife	31	25,6

In this study, male patients were in the majority, with a sex ratio of 2.36. The mean age was 51.34 ± 13 years.

The other occupations were primarily: manual laborers (7.4%), drivers (5.8%), and teachers (2.5%).

3.3. Clinical Data

Table 2. Distribution of patients according to clinical data.

Clinical data	n=121	%
Medical history		
History of blood transfusions	16	13,2
Hypertension	41	33,9
Diabetes	24	19,8
History of familial liver disease	21	17,3
History of urinary schistosomiasis	19	15,7
Toxic habits		
Alcohol	19	15,7
Tobacco	53	43,8
Hepatotoxic medications	76	62,8
Clinical signs		
Abdominal pain	108	89,3
Jaundice	103	85,1
Gastrointestinal bleeding	33	27,3
Ascites	98	81
Physical signs		
Hepatomegaly	68	56,2
Splenomegaly	39	32,2
Dullness	89	73,5
Collateral venous circulation	18	14,9
Clinical characteristics of hepatomegaly		
Painful	45	37,2
Hard	43	35,6
Firm	25	20,7
Sharp lower edge	55	45,6
Nodular	52	42,9
Concept of gastrointestinal bleeding		
Hematemesis	18	14,9
Melena	9	7.43
Rectal bleeding	6	4,27

Hepatomegaly with a sharp lower border was observed in 45.6% of cases.

3.4. Ultrasound Data

Table 3. Distribution of patients based on ultrasound-derived liver morphological data.

Données échographiques	n=121	%
Size of liver (cm)		
< 15	54	45,0
> 15	67	55,0
Structure du foie		
Heterogeneous	117	96,7
Homogeneous	3	2,5
Diffuse steatosis	1	0,8
Liver margins		
Irregular	88	73,0
Regular	33	27,0
Dysmorphia		
Yes	90	74,0
No	31	26,0

Données échographiques	n=121	%
Presence of nodules		
Yes	73	60,0
No	48	40,0
Size of nodules (cm)	n=73	
< 3	27	37,0
> 3	46	63,0
Number of nodules		
Single	5	7,0
Multiple	68	93,0

All patients exhibited at least two of the HTP signs (100% of cases).
The absence of respiratory modulation in 33.9% of cases.

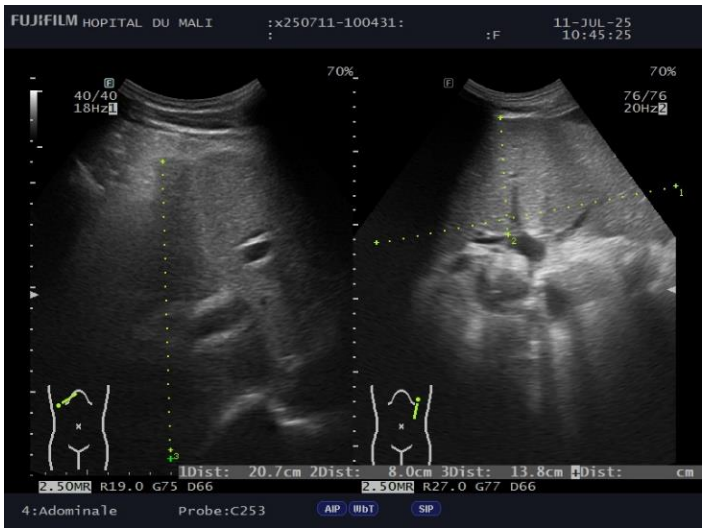

Figure 1. *Coronal ultrasound of the liver showing a mottled liver with moderate ascites.*

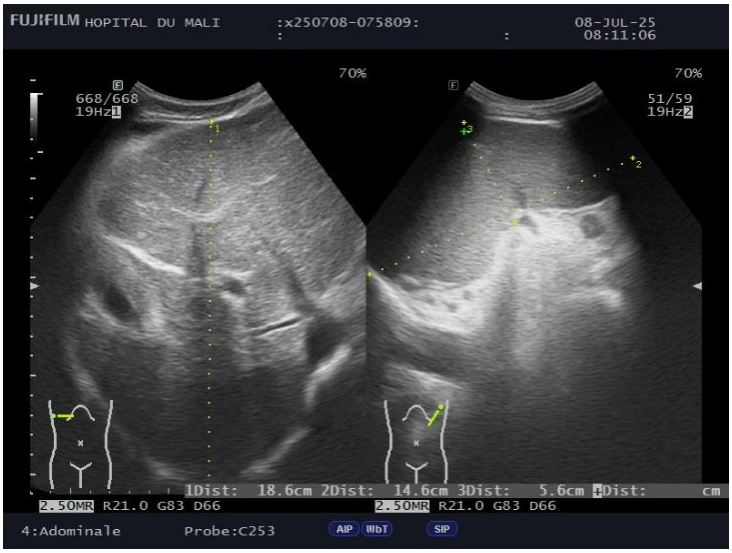

Figure 2. *Coronal ultrasound of the liver showing hepatosplenomegaly.*

Table 4. Distribution of patients based on signs of decompensation and complications on ultrasound.

Signs of decompensation and complications on ultrasound	Variable	n=121	%
Diameter of the portal trunk	11-15 mm	48	39,7
	> 15 mm	23	19
Patency of the portal trunk	Permeable	81	66,9
	Partial thrombosis	36	29,8
	Complete thrombosis	4	3,3
Direction of flow	Hepatopetous	80	66,1
	Hepatophugous	39	32,2
	Alternating	2	1,7
Collateral venous circulation	Yes	18	14,9
	No	103	85,1
Intra-abdominal fluid accumulation	Yes	98	81
	No	23	19
Respiratory variation	Yes	80	66,1
	No	23	33,9
Spleen	Normal	81	66,9
	Splenomegaly	40	33,1

Complications on ultrasound
The complications were primarily ascites (81%), portal vein thrombosis (33.1%), and hepatocellular carcinoma (4.13%).

Figure 3. Abdominal ultrasound showing transverse and oblique views of the liver and spleen, revealing dilation of the portal trunk.

4. Discussion

4.1. Prevalence

We identified 121 cases of cirrhosis diagnosed among 3,142 abdominal ultrasounds performed, representing a prevalence of 3.85%. Diarra et al. [14] reported a hospital prevalence of 2.35% in their study on the progression of cirrhosis. Sehounou et al. [15] found a prevalence of 22.6% in their study on liver cirrhosis in Benin. Zikoume S. [8] reported a prevalence of 4.1% for cirrhosis in his study. In our context, this prevalence of cirrhosis reflects the high prevalence of hepatitis B and C.

4.2. Socio-demographic Data

In this study, males were in the majority, with a sex ratio of 2.33. This result was higher than that reported by Martin et al. [16], who found a slight male predominance with a sex ratio of 1.15 in their study on the accuracy of ultrasound and non-invasive markers of fibrosis in identifying patients with cirrhosis. Diarra et al. [14] found a sex ratio of 1.47 in favor of men, based on the progression of cirrhotic disease. These results reflect both behavioral and biological risk factors, highlighting the importance of targeting the male population in liver disease prevention and screening programs.

The 51–60 age group was the most common, accounting for 24.8% of cases, with a mean age of 51.34 ± 13.86 years. These results were similar to those reported by Driouiche et al [18] in Morocco, who found a mean age of 54.4 years, as well as to the work of Mohammad et al [19] in Nigeria, where the mean age ranged between 45 and 55 years. These results demonstrate the chronic nature of the disease, its gradual and slow onset, as well as its late detection in resource-limited settings such as Mali.

4.3. Clinical Data

In this study, the predominant clinical manifestations were abdominal pain (89.3%), jaundice (85.1%), and ascites. These Figures are higher than those reported by Mbendi et al. [20], where abdominal pain (44.9%), jaundice (42.3%), and ascites (64.7%) were observed in patients. In the study by Diarra et al. [14], ascites was the reason for consultation in 49.1% of cases. In our context, these proportions indicate a diagnostic delay often linked, on the one hand, to the population's lack of information regarding cirrhosis and, on the other hand, to the sociocultural and economic conditions of the majority of the population.

Physical signs included dullness (73.5%), hepatomegaly (56.2%), and splenomegaly (32.2%). These results were similar to those observed by Mbendi et al. [20] in Kinshasa, who found dullness in 64.7% and hepatomegaly in 54.1% of cases. Diarra et al. [14] reported ascites and jaundice as physical signs found in 70.2% and 54.4% of cases, respectively, during their study. The observation of these signs underscores the importance of a comprehensive clinical evaluation, confirmed by paraclinical tests such as ultrasound, in diagnosing complications of cirrhosis.

4.4. Ultrasound Findings (Morphological and Spectral)

On ultrasound, hepatomegaly was present in 55% of patients. The liver's echostructure was heterogeneous in 96.7% of cases, and the margins were irregular (73%). Hepatic dysmorphism was present in 74% of patients, and nodules in 60%. Koama et al. [1] reported that, on ultrasound, the right lobe of the liver was atrophic in 19% of cases. Hepatomegaly was present in 11% of cases. The liver margins were irregular in 55% of cases. The liver echostructure was micronodular and granular in 71% of cases in their study on the morphometric aspects of the cirrhotic liver and the prevalence of portal hypertension among chronic hepatitis B virus carriers in Burkina Faso. In the study by Mohammad et al [17] in Nigeria, hepatic nodules were observed in 15% of patients. These characteristic ultrasound signs of liver cirrhosis confirm the indispensable role of this examination in the screening and diagnosis of this condition.

In our study, the indirect signs of portal hypertension were primarily characterized by dilation of the portal trunk in 19% of cases, followed by the presence of partial or total thrombosis in 33.1% and the presence of retrograde hepatic flow in 32.1% of cases. A prevalence of 28% had been reported by Dupuis et al. in their study [19]. All these results were consistent with those in the literature, reflecting disease decompensation [19, 20]. These results demonstrate the direct impact of cirrhosis on hepatic vascularization.

4.5. Complications on Ultrasound

Ascites was the most common complication encountered, accounting for 81% of cases. Kader et al. reported an ascites rate of 94.3% in their study. Most patients in Africa were diagnosed at advanced stages, which explains this increase in complications.

5. Conclusion

These results showed that cirrhosis remains a common and serious condition due to its complications, which can be severe. The majority of patients were men, with a mean age of 51.34 years. Ultrasound findings included hepatomegaly, heterogeneous liver texture, irregular margins, nodules, and portal vein dilation. Ultrasound is an essential tool for screening, diagnosing, and monitoring complications associated with this disease.

Abbreviations

SPSS	Statistical Package for the Social Sciences
MHz	Megahertz

Author Contributions

Camara Mody Abdoulaye: Conceptualization, Project administration, Writing – review & editing

Guindo Ilias: Supervision

Traore Mohamed Maba: Supervision

Yanogue Aldjouma: Formal Analysis, Writing – original draft

Diarra Hawa: Supervision

Sanogo Souleymane: Supervision
Kone Abdoulaye: Supervision
Goita Youssouf: Investigation
Kouma Alassane: Supervision
Toure Boubacar Mama: Supervision
Maiga Oumou: Supervision
Kamia Boureima: Supervision
Yara Mahamadou: Supervision
Coulibaly Salia: Validation
Sidibe Siaka: Validation

Conflicts of Interest

The authors declare no conflicts of interest.

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