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A study on the evaluation of obstructive jaundice using ultrasonography in a tertiary care centre

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Abstract

Introduction: Ultrasound examination plays a significant role in demonstrating the aetiology of obstructive jaundice. Routine abdominal Ultrasonography shows the size of the bile ducts, which may define the level of the obstruction and identify the cause, and gives other information related to the disease. The purpose of this work is to study the sonographic features of obstructive jaundice and to identify the most common causes and symptoms of the disease.

Method: This is a cross-sectional study conducted in MIMS, Vizianagaram from March 2019 to November 2019. The study population was composed of 200 cases that had been selected randomly with clinical features of jaundice which were examined using an ultrasound machine, 3.5 - 7 MHz probe.

Results: The study revealed that 51% of the study population with obstructive jaundice were female, and 49% was male. The common causes of obstructive jaundice were biliary stones which were common in females and abdominal masses, which were common in females, too. Nausea, yellowish discoloration and abdominal pain were the most common symptoms. The causes of obstructive jaundice showed a significant difference between males and females.

Conclusion: Ultrasound plays a significant role in detecting and evaluating obstructive jaundice, and it should be the first line of investigation. Gender and age show a considerable difference with the causes of obstructive jaundice.

Keywords: Obstructive, jaundice, ultrasonography, evaluation, Andhra Pradesh

Introduction

Obstructive jaundice is a particular type of jaundice and occurs when the essential flow of bile to the intestine is blocked and remains in the bloodstream. It might be due to blocked bile ducts caused by gallstones, or tumours of the bile duct which can block the area where the bile duct meets the duodenum. These may be cancerous.

Pancreatic cancer can also be a cause of blockages as it often occurs near to the ampulla of Vater which joins the pancreas gland to the duodenum. Other conditions that can cause obstructive jaundice include those that cause pressure on the bile duct such as swelling of lymph glands, scar tissue (from previous infections or surgery), or a cyst, possibly of the pancreas [1]. The majority of patients with suspected jaundice always present with yellowish skin, conjunctiva of eyes and mucous membrane. It caused by an increase in the level of circulating bilirubin and becomes obvious clinically when the level exceeds 50 mmol/l. Jaundice may result from excessive destruction of red cells (hemolytic jaundice), failure to remove bilirubin from the bloodstream (hepatocellular jaundice), or obstruction to the flow of bile from the liver (cholestatic or obstructive jaundice). In literature, the causes of jaundice are classified into prehepatic, hepatic (intrinsic) and post hepatic (extrinsic). The intrinsic lesions include common bile duct (CBD) stone, cholangiocarcinoma and inflammatory occlusion due to wall thickening in patients with cholangitis [2], and the extrinsic lesions have pancreatic masses such as carcinoma of the head of the pancreas, pancreatitis, pancreatic pseudocyst, periductal adenopathy and hepatic masses. Obstructive jaundice is often referred to as surgical jaundice because operating will relieve the obstruction and permit the free flow of bile [3]. Ultrasound examination plays a significant role in demonstrating the aetiology of obstructive jaundice. Routine abdominal Ultrasonography shows the size of the bile ducts, which may define the level of the obstruction and identify the cause, and gives other information related to the disease (e.g.,

Hepatic metastases, gallstones, hepatic parenchymal change) It also identifies bile duct obstruction accurately though results are largely operator-dependent, and it readily demonstrates both benign and malignant causes of obstruction as well as any associated conditions and complications. Being relatively cheap, readily available and non-invasive, it is usually the preferred initial investigation [4, 7].

So, it can very quickly demonstrate the result of obstructing gall stones which are characterized by an echogenic mobile structure with posterior acoustic shadowing.

The purpose of this work is to study the sonographic features of obstructive jaundice and to identify the most common causes and symptoms of the diseases.

Materials and Methods

Type, Duration and Setting of Study: A hospital-based Cross-Sectional Study at Maharajah's Institute of Medical Sciences, Vizianagaram from March 2019 to November 2019.

Sample Size: 200 cases with clinical features of jaundice have been selected randomly.

Inclusion Criteria: All patients with clinical features of jaundice.

Exclusion Criteria: Patients who are already diagnosed with malignant tumours of the pancreas.

Data Collection and Procedure

After taking informed consent from the patients, data is collected from the patient in the form of proforma, which includes general and clinical details. Experienced sonographers and sonologists performed the ultrasound examinations. All patients were scanned by more than one sonologist with the same ultrasound machine using the same international guidelines and protocols for conducting the ultrasound investigation. The liver, pancreas and hepatic ducts were scanned with ultrasound using 3.5 to 5 MHz probes. Ultrasonic jelly was used to ensure good contact between the transducer and the skin and allow total transmission of the sound beam. The sonographic display parameters such as overall gain, focusing, and depth gain compensation had been adjusted to enhance the visibility of the images.

The liver was scanned in the transverse and longitudinal sections. The normal liver showed homogenous echotexture. Thus, focal masses could easily be detected. To find the common hepatic duct, the sonologist must identify the straight segment of the right portal vein. By using the right subcostal or lower intercostal window with the patient in the supine, the gall bladder and liver could be well demonstrated. The common hepatic duct is identified anterior to the right portal vein when the transducer is rotated slightly. The pancreas was scanned with the probe placed at the epigastric region using longitudinal and transverse sections with the patient in the supine position. The patient is ordered to drink water to facilitate visualization of the pancreas. Malignant tumours of the pancreas are always hypoechoic heterogeneous irregular masses and mainly involved the pancreatic head.

Statistical Analysis

Data were analysed and initially summarized as mean \pm SD

in the form of comparison tables. Statistical analysis was performed using the standard Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, USA) version 20 for windows. Descriptive statistics were used to describe variables; per cent for qualitative variables.

Results

A total of 200 patients were seen during the study period with obstructive jaundice. They had been investigated with ultrasound using the abdomen imaging protocol. The study population composed of 98 males and 102 females, as shown in Table 1.

Their ages ranged from 20 to 84 years old. Table 2 showed the distribution of age groups in the study population. Most of the jaundiced patients were emphasized at the age group of 41 - 60 years old.

Table 3 showed the relationship between ultrasound findings (causes) among the study population. The prevalence of obstructive jaundice increased as age advanced in the study group.

The frequency of symptoms is shown in Table 4; nausea, yellow discoloration and abdominal pain are the highest values.

The biliary stones and abdominal masses were the most common causes of obstructive jaundice. There was a significant relationship between the sonographic findings and gender. It was observed that the causes of obstructive jaundice showed a significant difference between males and females.

Discussion

The prominent sonographic feature of obstructive jaundice is dilatation of intra and extra-hepatic biliary ducts which are visible at longitudinal and transverse scanning. In longitudinal section, two anechoic tubes are seen side by side, and in transverse section, the dilated bile ducts and adjacent portal vein branch have seen as two adjacent anechoic circles [8]. In this study, it has observed that obstructive jaundice involves female more than male of our study sample. This result is consistent with a study conducted by Gameraadin *et al.* [9] who reports that female is more frequently affected by obstructive jaundice than males. Another study confirms that the frequency of obstructive jaundice is higher among the female population, and the most frequent causes of obstructive jaundice are gall stones (54.1% of patients) [10].

The incidence of obstructive jaundice increases as age advances, this is attributed to a deficiency of immunity, and thus the incidence of masses and stones are probably increased. In our study, it is noticed that the prevalence of obstructive jaundice occurs after the age of 40 years old. This result is consistent with Gameraadin *et al.* [9], who stated that the most affected groups were 45 - 75 and 75 - 95 years old, respectively. Another study [11] reveals the range age between 60 - 70 years old is the most involved, and this is also in agreement with our finding. In this study, biliary stone (in bile duct or gallbladder) is the first common cause of obstructive jaundice (64.5%) as it obstructs the flow of bile which is retained in liver tissue and causes yellow discoloration. The sonographic appearance of the stone was characterized by its echogenicity, focal shape and produced sharp acoustic shadowing. A study done by Verna *et al.* [12] had studied the aetiological spectrum of obstructive jaundice; they reported that malignant

obstructive was more common than benign (62.73% vs 47.27%), carcinoma of the head of the pancreas was the commonest aetiology (33.63%) followed by choledocholithiasis (29%). They concluded that carcinoma of the head of pancreas and choledocholithiasis were the commonest malignant and benign aetiology respectively. In the present study, gall stones are more common in females than males. The masses represent the common cause of obstructive jaundice. In this study, abdominal masses are the second cause (31%) of obstructive jaundice. In this study, these masses were not differentiated as benign and malignant; this needs biopsy and histopathological analysis, which have taken after ultrasound investigation. This result agrees with a study done by Iqbal *et al.* [11], who reported that 32% of the causes of obstructive jaundice were Ca-head of the pancreas. In literature, tumours causing biliary channel obstruction are generally ampullary carcinomas, gall bladder carcinomas extending into the CBD, metastatic tumours (usually from the gastrointestinal tract or the breast), secondary lymphadenopathies at the porta hepatis and cholangio carcinoma [12]. In our study, abdominal masses are observed in females more than males. In previous studies, the disease is more common in men than women [13, 14] though the difference in rates has narrowed over recent decades, probably reflecting earlier increases in female smoking. In the United States, the risk for African Americans is over 50% greater than for whites, but the rates in Africa and East Asia are much lower than those in North America or Europe. The United States, Central and Eastern Europe, Argentina and Uruguay all have high rates [15]. The present study has identified the main symptoms of obstructive jaundice. Was observed that vomiting, yellow discolouration and abdominal pain are the most common symptoms. In literature, the signs and symptoms of obstructive jaundice differ depending on the completeness of the blockage, and the disease course varies among individuals. Some people with obstructive jaundice may have no symptoms initially, but if the condition persists, they may have severe abdominal pain, fever, nausea, and vomiting. A complete blockage may also occur, posing a risk of infection leading to liver and gallbladder damage [16].

Table 1: Frequency distribution of Gender

Gender	Frequency	%
Male	98	49
Female	102	51
Total	200	100

Table 2: Frequency distribution of age groups of the study population

Age Groups (years old)	Frequency	%
20-40	63	31.5
41-60	96	48
61-80	30	15
>80	11	5.5

Table 3: Causes of obstructive jaundice among study population

Ultrasound findings	Frequency	%
Biliary Stones	129	64.5
Abdominal Masses	62	31
Others	9	4.5

Table 4: Distribution of symptoms of obstructive Jaundice among study population

Symptoms	Frequency	%
Fever	104	52
Nausea/Vomiting	192	96
Yellow Discolouration	188	94
Abdominal pain/RUQ pain	190	95
Abdominal Masses	6	3
Abdominal distention	46	23
Weight Loss	53	25.5

Conclusion

Ultrasound was a superior diagnostic tool in detecting and assessing biliary system obstruction because it was painless, available, accurate and non-invasive. The ageing and gender were considered as risk factors of obstructive jaundice.

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