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STUDY OF HEPATO-BILIARY SYSTEM PATHOLOGIES USING MRCP

Radiology

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ABSTRACT

Objective : Magnetic Resonance Cholangiopancreatography (MRCP) is increasingly being used as a noninvasive alternative to ERCP . Currently it gaining a high percentage of the diagnostic results comparable with those from ERCP for various hepatobiliary pathologies. The importance of the study derived from the importance of MRCP as good diagnostic procedure in detecting and characterization of the hepato-biliary diseases.

Methods: The incidence of the hepatobiliary diseases has been increased in Sudan. to estimate characteristic assessment of the disease , a study was conducted among Sudanese patients affecting from hepatobiliary disorders using Magnetic Resonance. Population of the study including 50 patients

Results: The main findings of the study reveal that MRCP is more reliable for diagnosis of hepatobiliary diseases. The data analyzed by MRCP screening revealed that 98% of the population had abnormalities in the biliary system, compared to 44% with ultrasound. The statistics analyzed from the patient's age and gender showed that females were 58% more affected than males. The most common age groups between 62-82 years with percentage of 44%. The results obtained also showed that older patients were more affected than younger patients. The results of the diagnosis using MRCP detected about 52% of the population with gallstones, 5% with common bile ducts and 20% with choleangiocarcinom.

Conclusion: The study concluded that, the MRCP is the best choice for detecting the hepatobiliary diseases comparing with ultrasound and ERCP .And the use of heavily T2 weighted images techniques are effective procedure in characterization and differentiation of the disease. The study confirmed that MRCP is a good diagnosing procedure which offer new method for detecting the hepato-biliary diseases in its early stage, without complication as other invasive procedure such as ERCP.

KEYWORDS

Magnetic resonance cholangiopancreatography (MRCP) , hepato-biliary system diseases , ERCP , ultrasound

Introduction:

Magnetic resonance cholangiopancreatography (MRCP) is an abdominal imaging method that allows non-invasive visualization of the Pancreatobiliary tree and requires no administration of contrast agent. So that it recommend to use in hepato-biliary disorders. (1) . MRCP is increasingly being used as a non-invasive alternative to ERCP , it's well tolerated and in cases where it is not possible to carry out interventional endoscopy, MRCP should be the first choice of diagnostic tool . It has been exactly two decades since magnetic resonance cholangiopancreatography (MRCP) was first described, over this time , the technique has evolved considerably , aided by improvements in spatial resolution and speed of acquisition . It has no wan established role in the investigation of many biliary disorders , serving as a non-invasive alternative to endoscopic retrograde cholangiopancreatography (ERCP) . (2) . The techniques are comparable with respect to diagnostic accuracy but MRCP offers the advantages of 3D imaging and imaging reformatting , as well as having no morbidity and mortality. Using T2 weighted imaging is better to obtain signal from biliary system and inhibit signals from surrounding fats which produce good visualization of the hepato-biliary diseases . It makes use of heavilyT2-weighted pulse sequences , thus exploiting the inherent differences in the T2- weighted contrast between stationary fluid-filled structures in the abdomen (which have along T2 relaxation time) and adjacent soft tissue(which as a much shorter T2 relaxation time). Static or slow moving fluids within the biliary tree and pancreatic duct appear of high signal intensity on MRCP, whilst surrounding tissue is of reduced signal intensity.(3).

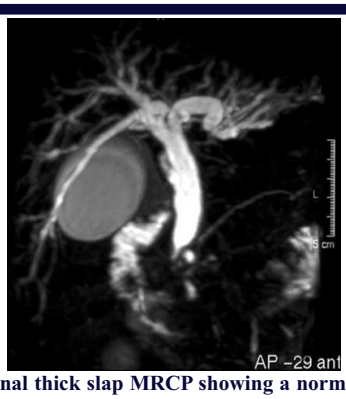
Heavily T2- weighted images were originally achieved using a gradient-echo (GRE) balanced steady-state free precession technique. A fast spin-echo (FSE) pulse sequence with a long echo time (TE) was introduced shortly after, with the advantages of a higher signal-to-noise ratio and contrast-to-noise ratio and a lower sensitivity to motion and susceptibility artifacts.(4).

Modified FSE sequences have been described, including rapid acquisition with rapid enhancement (RARE), half-Fourier acquisition single-shot turbo spin-echo (HASTE) and fast-recovery fast spin-echo (FRFSE) sequences .Both breath-hold (using a single shot approach) and non- breath-hold techniques (with respiratory triggering) have been used, with images obtained either as a two-dimensional (2D) or three-dimensional (3D) acquisition .A 3D technique provides a higher signal to noise ratio, which is traded off for thinner contiguous slices. (5).

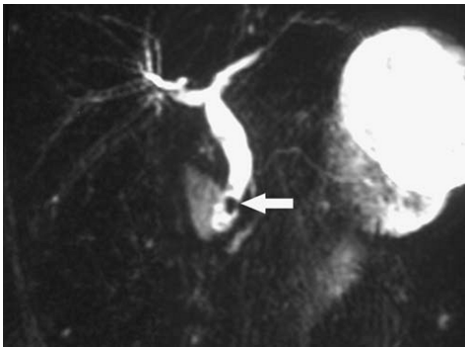
A3D technique provides a higher signal to noise ratio, which is traded off for thinner contiguous slices . Acquiring images with near is tropic voxel improved post-processing manipulation of the images with multi- planar reconstruction, maximum intensity projection (MIP) and volume rendering. A thick slab MRCP may obscure small filling defects or strictures as the spatial resolution is degraded because of volume averaging effects. Partial volume effects also degrade spatial resolution in MIP reformats, leading to the missed filling defects (Fig 2,3) (6.7). The introduction of faster gradients and a parallel acquisition technique has resulted in even greater spatial resolution and faster acquisition times. More recently ,functional assessment of biliary excretion and pancreatic exocrine function has become possible with the use of bile duct on Ultrasound.(Fig 3). MRCP is commonly used prior to laparoscopic cholecystectomy to diagnose bile duct calculi and bile duct variants and to avoid of intra operative exploration of common bile duct. (11,12,13,14).

The incidence of heptobiliray diseases has been increased in Sudan. This study was conducted to hepatobiliary contrast media and secretin respectively.(8,9,10)

Magnetic resonance choleangiopencreatography issues heavily T2 weighted image that shows stationary fluids such as high signal with moving fluids and solids as low signal .The bile ducts and gall bladder are there for seen as bright structures on adarkbackground . MRCP has largely replaced by diagnostic ERCP (Endoscopic retrograde cholangio-pancreatography) , as the procedure of choice for imaging of the biliary system including a assessment of jaundice patients with dilated biliary ducts. This study were conducted to assessment and review characteristics of heptobiliray diseases among Sudanese patient using MRCP .



(Fig .1) Coronal thick slap MRCP showing a normal biliary and pancreatic duct anatomy



(Fig.2) Cholelithiasis gall stones appear as signal void-filling defects in Coronal thick slab MRCP in distal common bile duct (arrow)

(Fig.3) Cholelithiasis. Ultrasound image obtained with a 4-MHz transducer demonstrates a stone in the gall bladder neck with typical a acoustic shadow.

Material and Methods:
This a descriptive analytic study conducted in Sudan - Khartoum state hospital.

The tools of the study including a special sheet (closed questionnaire) were being designed to collect the data.

Samples analyzed in this study are consisted of 50 patients diagnosed by Magnetic Resonance Cholangio pancreatography (MRCP) radiologic tool.

The sample size were selected using control sample.

Statistical analyses for samples were performed using the SPSS software (Statistical Package for the Social Sciences).

Variables of the study including gender, age, weight, MRCP and ultrasound findings.

Results:
The following tables and figures presented data that obtained from(50) patients whose were examined by MRI for detecting diseases of hepato-biliary system . The patient's data including gender, age, weight, MRCP and ultrasound findings.

Table1:Showed the frequency distribution of gender with their percentages:

Female	Male	Gender	Total
29	21	Frequency	50
58%	42%	Percent	100%

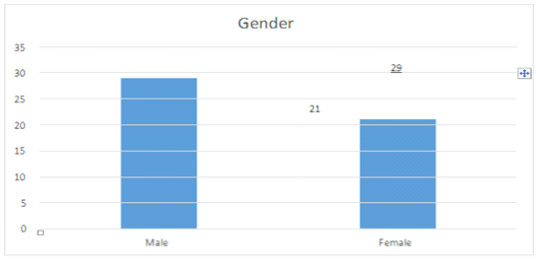


Figure1: bar charts demonstrates the frequency of gender.

Table2: Showed the frequency distribution of weight with their percentages:

Rang of weight in kg	Frequency	Percent
50-60	21	42%
61-71	16	32%
72-82	12	24%
83-93	1	2%
Total	50	100%

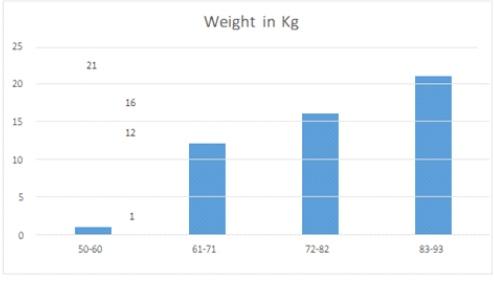


Figure2: bar charts demonstrates the frequency of patient's weight.

Table3:Showed the frequency distribution of age with their percentages:

Percent	Frequency	Age group
28%	14	20-40
24%	12	41-61
44%	22	62-82
4%	2	83-103
100%	50	Total

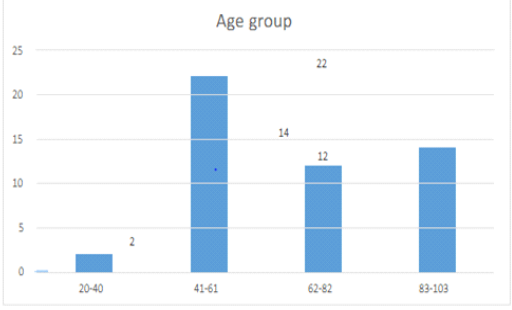


Figure3:barcharts demonstrates the frequency of patients age.

Table4: Showed the frequency distribution of MRCP finding with their percentages:

Total	Gallstones	C.B.D stones	Cholecystectomy	Cholangio carcinoma	Intra-Hepatic Stone	Liver masses	Ascites	Normal	Diseases
50	26	3	1	10	3	2	4	1	Frequenc
100 %	52%	6%	2%	20%	6%	4%	8%	2%	Percent

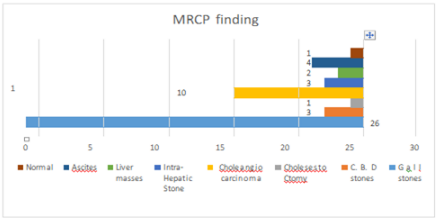


Figure4 : barcharts demonstrates the frequency of MRCP finding.

Table5:Showed the frequency distribution of U/S finding with their percentages:

Total	Gallstones	C.B.D stones	Cholecystectomy	Cholangiocarcinoma	Intra-HepaticStone	Liver masses	Ascites	Normal	Diseases
50	8	1	1	6	2	3	1	28	Frequen
100%	16%	2%	2%	12%	4%	6%	2%	56%	Percent

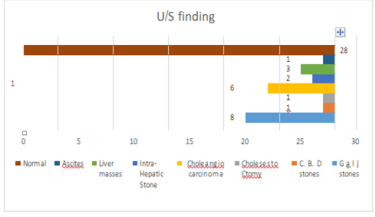


Figure5:barcharts demonstrates the frequency of U/S finding.

Table6 :Showed the similar findings of MRCP and U/S:

Total	Gallstones	C.B.D stones	Cholecystectomy	Cholangiocarcinoma	Intra-Hepatic Stone	Liver masses	Ascites	Normal	Diseases
50	26	3	1	10	3	2	4	1	MRCP
50	8	1	1	6	2	3	1	28	U/S

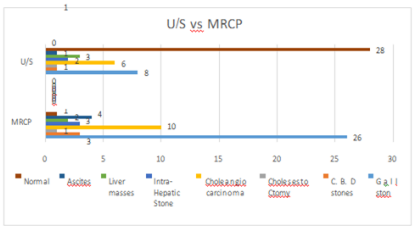


Figure 6 : bar charts demonstrates the frequency of MRCP vs U/S.

Discussion:

This a study of hepato-biliary system pathologies using Magnetic Resonance Cholangiopancreatography (MRCP), which were conducted among Sudanese patents . The results obtained showed MRCP detecting of 98% population with hepato- biliary system abnormalities. Only 44% of the abnormalities detected by ultrasound and this is agreeing with a previous study of Kim Kim MJ (2002)

The most common affected gender female 29 by58% and the most common affected age range between (62-82) years by 44%.Also the study found that MRCP is detected 52% of the population under study with different pathologies including of 16% Gall stone, and 5% common bile duct stone in addition to 20% as choleangiocarcinoma .This finding agreeing with a previous study of Taylor (1991). So this approved that MRCP is the best choice for detecting the hepatobiliary diseases comparing with ultrasound.

Conclusion:

The study concluded that most of hepato-biliary diseases diagnosed by MRCP than other imaging modalities , also concluded that females are more affected by hepato-biliary diseases more than males and elderly patients are more affected than the younger patients. Regarding techniques , the study found that , uses of heavily MRCP T2 weighted imaging are effective procedure in characterization and differentiation of hepato-biliary diseases , and the diagnose may need to revised as more details from the patient history, ultrasound result, and compare this with lap investigation histopathology particularly in those suspected with carcinoma.

The study confirmed and ended by that the MRCP is noninvasive or harmful procedure, these feature make it good choice in diagnose the hepato-biliary diseases.

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