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Original Article,

CT-profile of bare jaundice in a Congolese population followed at The Rock Imaging Center in Kinshasa

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Abstract:

Context and objective. The prevalence of liver pathologies has been increasing since the advent of more sophisticated medical imaging methods. Our objective was to describe the CT aspects of liver pathologies observed at CIMR.
Methods. This was a descriptive observational study of a retrospective series of 304 cases received at the ROCHER Medical Imaging Center (CIMR) in Kinshasa over a period of 24 months, going from January 2020 to January 2022. The parameters of the interests were sociodemographic, clinical and CT.
Results. The average age was 55.42±16.6 years with the range from 35 to 71 years with a F/M sex ratio of 1.3. The characterization of a mass and the exploration of cholestasis represented the most frequent indications. Furthermore, the average age of patients with solid masses (57.2±9.9 years) was statistically higher (p=0.031) compared to the average age of patients with fluid masses (49.7± 9.8 years). Bile duct dilatations were accompanied by detectable masses in 88.2%. The same observation was made in the dilatations of VBIH and normal VBP (n=35) which were accompanied by tumor lesion in 88.6%. Out of a total of 146 cases of diffuse pathologies observed, cirrhosis was found in 85% compared to 15% of cases for fatty liver.
Conclusion. CT makes it possible to highlight liver pathologies in a certain frequency. Solid lesions classified LI-RADS 5 and LI-RADS 4 are the most common (18%). While biliary cysts and abscesses are the most commonly found fluid masses.

Keywords: CT, liver pathologies, solid masses, fluid masses.

Introduction:

Context and rationale: Cholestasis syndrome corresponds to all the clinical and biological manifestations linked to the reduction or cessation of bile secretion (1-3). It can result either from obstruction of the bile ducts or from the cessation or reduction of bile production by hepatocytes (3,4).

The resulting jaundice is a warning sign reflecting a pathology of the bile ducts whose cause must be sought. Generally, the clinical examination and biological data make it possible to differentiate

obstructive jaundice from cholestatic liver disease (4). In the presence of a clinical picture, imaging is largely essential to confirm the obstruction, establish the site of the obstruction and make the etiological diagnosis (4,5).

Several medical imaging techniques are emerging today to refine the diagnosis: ultrasound, computed tomography, echoendoscopy, retrograde opacification, and MRI. This currently represents the diagnostic gold standard in biliary tract pathology by allowing an exhaustive study of the biliopancreatic tree (5-7). However, it is a cumbersome technique and less available, particularly in countries with limited resources such as the Democratic Republic of Congo. The objective of this article was to study the morphological aspects in CT of the main anomalies in the etiological diagnosis of naked jaundice.

Materıals And Methods:

Setting , type and period study

This was a descriptive observational study of a retrospective series of cases received at the ROCHER Medical Imaging Center (CIMR) in Kinshasa over a period of 4 years, going from January 2018 to January 2022.

Study population

During the conduct of our study, a total of **2370** abdominal or thoraco-abdomino-pelvic CT-scans were collected.

Patient selection criteria

Inclusion criteria: Were included in our study, all patients referred to the CIMR Imaging Department for abdominal CT to detect cholestasis syndrome or an abdominal mass.

Criteria exclusion: Patient with incomplete file as well as all patients with abdominal CT indicated for something else and who did not show an anomaly hepatic (incidentally).

Sample size

This was a non-probability and exhaustive convenience sample. Our sample size was n=304 reports .

Study parameters and operational definitions

Variables of interest: The collection concerned the following data: age and sex, incidental discovery, characterization of a mass seen on ultrasound, search for metastasis, search for complications of cirrhosis, exploration of cholestasis, post-traumatic assessment.

The major diagnostic criteria:

i). Hypervascularization in the arterial phase corresponding to an enhancement in the arterial phase, non-peripheral, unequivocal, in part or in whole of the observation and whose intensity or density is greater than that of the hepatic parenchyma

ii). Washout corresponding to the non-peripheral visual reduction and over time (during the early to later phases) of the enhancement of a portion or the entirety of the observation compared to the adjacent parenchyma. The observation appears hypovascular in the portal venous or late phase

iii). Capsule enhancement: corresponds to an enhancement with a smooth, uniform and well-defined outline, of the majority or the entirety of the observation

Auxiliary criteria in favor of non-specific malignancy: distinct nodule without contrast, peri-lesional enhancement in the late arterial phase or in the early portal phase, steatotic sparing within a solid mass.

Auxiliary criteria in favor of HCC: non-enhanced capsule: non-enhanced, smooth and regular delineation, nodule-within-a-nodule appearance: presence of smaller internal nodules in the main nodule, mosaic appearance: presence of nodules or distributed internal compartments randomly. Intralesional fatty load; hematic contents within the mass.

In this algorithm, the diagnosis of HCC is based, initially, on the combination of major signs including: enhancement in the arterial phase; the size of the lesion, the presence of a washout appearance in the venous and/or late phases, the presence of a peripheral capsule. Secondly, auxiliary signs can be applied in order to upclassify or underclassify a lesion compared to its initial classification.

Collection of CT data

All examinations were carried out on a 16- strip scanner (Somatom FORCE, Siemens Healthcare, Forchheim , Germany, manufactured in 2005) which has been in service for 6 years. The technical protocol for CT angiography is summarized in Table 2. The protocol presented below is routinely practiced in this department in adults after preparation made by exclusion of contraindication factors to the use of an iodized contrast product.

A CT scan with contrast injection was performed after the injection of 100 ml of omnipaque 350 mg at a rate of 3.5 to 4.0 ml/s following a series without injection. After an injection-scan delay of 4 to 28 seconds as determined by the bolus tracking software, sonographic angiography was obtained at 120 kVp , 300 to 400 mA. Collimation

was 0.5 mm with reconstruction of 1.25 to 2.0 mm. Rotation time was 0.3 to 0.5 seconds and table speed 7.5 mm/rotation.

The scans were interpreted a second time to obtain all the study criteria by a 4th year medical imaging assistant ' using PACS. The reading was taken in the pulmonary parenchymal window and in the mediastinal window.

Table: 1 Contrast medium application protocol and parameters

Detectors	**16**
kV	120
mAs	150
Turnaround time	0.5s
Pitch	1.2
Slice collimation	3mm
Slice width/increment	2 / 1.4mm
Iterative reconstruction	Model-based algorithm (ADMIRE, Siemens Healthcare, Forchheim , Germany)
Reconstruction Force	Level 3
Reconstruction core	Bf40
Post treatment	MPR, VRT and MIP
Automatic injector	Envision CT injector EHU 700, Medrad

Processing and analysis of statistical data

The data entered into Excel 2010 software (encoding) were then exported to IBM SPSS 21 (Statistical Package for Social Sciences), version 21.0 for processing and analyses. Means and standard deviation were calculated for symmetrically distributed quantitative data, relative proportions (%) and absolute proportions (n) for categorical data. The Pearson chi-square test was carried out to compare the proportions between categorical variables, while the T-student test allowed us to compare the means, the statistical significance threshold (p-value) was $p < 0.05$.

Results:

General characteristics of the study population

Table 2 below provides information on the general characteristics of the study population:

Table 2. General characteristics of the study population

	VARIABLES	n=304	%	X±SD	Min-Max
Age (years)	≤ 40	18	5.9	55.4±16.6	35 – 71
	40 – 49	70	23.0		
	50 – 59	98	32.2		
	60 – 69	86	28.3		
	≥79	32	10.5		
Sex ratio (F/M)	Male	130	43	1.3	
	Feminine	174	57		
Indication	Characterization of a mass	132	43.4		
	Exploration of cholestasis	76	25.0		
	Lucky find	34	11.2		
	Complication cirrhosis	26	8.6		
	Search for metastasis	24	7.9		
	Posttraumatic assessment	12	3.9		

Out of a total of 304 cases, 174 cases (57.2%) were female and 130 (42.8%) were male with an F/M sex ratio of 1.3. The mean age was 55.42±16.6 years with the range from 35 to 71 years. The age group of 50 to 59 years old was the most represented, followed by that of 60 years old to 69 years old and the other groups. Among the indications for CT examinations, the characterization of a mass and the exploration of cholestasis represented the most frequent indications.

Diagnostic interpretations of CT

Table 3 below provides us with information on the relative frequencies of CT diagnoses used in our environment:

Solid masses were the most common lesions found in 65.8% of cases, followed by diffuse pathologies with 45.4% of cases. Traumatic pathologies were the least frequently found with 3.3% of cases. Out of a total of 70 fluid masses diagnosed on CT, biliary cysts were the fluid masses most frequently found in 42.9% followed by abscesses in 37.1%. Comparison of fluid and solid masses in relation to the sex and age of patients. Female subjects were in the majority in solid (54%) and fluid (65.7%) masses with a statistically significant difference compared to male subjects (p=0.001). Furthermore, the average age of patients with solid masses (57.2±9.9 years) was statistically higher (p=0.031) compared to the average age of patients with fluid masses (49.7± 9.8 years). On the other hand, when comparing the age groups, we did not find a statistically significant difference

Table 3. Distribution of patients according to the CT diagnoses retained.

VARIABLES	n=304	%	**IC95%**
Solid masses	200	65.8	61.2 - 69.6
Diffuse pathology	138	45.4	42.4 - 47.6
Dilatation of the bile ducts	120	39.5	36.3 - 43.1
Fluid masses	70	23	20.2 - 26.0
Posttraumatic pathology	10	3.3	1.2 - 5.2

Dilations of the hepatic bile ducts on CT

The table above provides information on bile duct dilations. It appears that the dilations of the VBIH and VBEH were in the majority in a proportion of 70.8%. These dilations were accompanied by detectable mass in 88.2%. The same observation was made in the dilatations of VBIH and normal VBP (n=35) which were accompanied by tumor lesion in 88.6%. Above, figure 5 provides us with information on diffuse pathologies. Out of a total of 146 cases of diffuse pathologies observed, cirrhosis was found in 85% compared to 15% of cases for fatty liver. Below, Table 5 shows us the comparison of the proportions between diffuse pathologies (cirrhosis and steatosis) in relation to the age and sex of the patients.

Table 4. Distribution of patients according to bile duct dilations.

VARIABLES	**n=120**	**%**	**IC**
Dilation of VBIH* and VBEH*	**85**	**70.8**	**67.1 - 72.4**
With detectable mass	*75*	*88.2*	*86.3 - 90.5*
Without detectable mass	*10*	*11.8*	*9.8 - 13.7*
Dilatation of VBIH and normal VBP**	**35**	**29.2**	**27.0 - 31.3**
Tumoral	*31*	*88.6*	*86.3 – 91.6*
Cholangiopathy	*4*	*11.4*	*9.6 - 13.1*

**Voies biliaires intra-hépatique and voies biliaires extra-hépatiques*
***Voies biliaires principales*

Discussion:

This study, which aimed to describe the diagnostic profile of bare jaundice on CT, showed us that out of a total of 304 cases retained for abdominal and/or thoraco-abdominal CT-scan, the indications for CT examinations, the Characterization of a mass and exploration of cholestasis represented the most frequent indications.

In the study by Molua et al. (4) in 2022, 95.3% of CT indications were clinically oriented, of which cholestasis syndrome represented 50% of cases. Only 4.7% of patients consulted for a suspicion of pancreatic pathology on ultrasound. As well as the results of Biwole MS et al. (5) who found 81.4% clinical indication and only 16.7% ultrasound guidance. This large predominance of clinical indication is justified by the fact that, if for pathologies of the endocrine pancreas (diabetes mellitus in particular) and hepatitis the diagnosis seems to be common and easy in the medical environment of countries with limited resources, the development of pancreatic tumors and hepatic tumors whose evolution is not always alarming, require a radiological diagnosis which is still not accessible to everyone at the appropriate time, in our environments, in particular due to the absence of assured health care coverage. health.

We found in our series that dilatations of the VBIH and VBEH were present in a proportion of 70.8%. These dilations were accompanied by detectable mass in 88.2%. The same observation was made in the dilatations of VBIH and normal VBP (n=35) which were accompanied by tumor lesion in 88.6%.

Furthermore, Molua et al. (4) who worked on pancreatic tumors, reported that the Wirsung duct was dilated in 43 patients (50%), most of whom had tumor pathology ($p < 0.001$). So much for Atif Zaheer et al. (7) who found in patients with histologically confirmed pancreatic cancer a focal mass (78%), pancreatic ductal dilatation > 5 mm upstream of the mass (69%) and parenchymal atrophy (53%). .

Indeed, pancreatic adenocarcinoma typically results (in 85 to 95% of cases) as a hypodense mass, often lobulated, after injection of iodinated contrast material. In 5 to 15% of cases the lesion is iso-dense to the pancreas and therefore not directly visible (1).

Limitations and strength of the study : Documentary study, absence of anatomopathology data, absence of comparison with ultrasound and MRI data.

Conclusıon:

This investigation to describe the diagnostic profile of naked jaundice on CT showed us that tumor origins are important with in most cases a dilation of the intrahepatic bile ducts. This is a young adult subject with almost equal reach of both sexes.

Addıtıonal Informatıon:-

Disclosures: All authors have confirmed that this study did not involve animal sub-jects or tissue.

Conflicts of interest: In compliance with the ICMJ, all authors have declared that no financial support was received from any organization for the submitted work. All authors have declared that they have no financial relationships at present study.

Contribution of authors: All authors confirmed having participated.

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