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Epidemiological and scanographic profile of pancreatic pathologies in 3 radiology departments in Kinshasa

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Abstract
Context and Objective: Pancreatic pathologies are diverse and often difficult to diagnose, combining clinic, biology and radiology. The objective of this work was to describe the epidemio-scanographic aspects of pancreatic pathologies in 3 radiology departments in Kinshasa.
Methods: Descriptive documentary study conducted in 3 radiology departments in Kinshasa from January 2016 to June 2021, having retained 86 reports of patients with pancreatic pathology diagnosed by abdominal CT-scan.
Results: Out of a total of 2342 reports compiled, 86 mentioned pancreatic pathologies, i.e. a frequency of 3.7%. Pancreatic tumors were the most common (62 cases/86); followed by acute pancreatitis (15 cases/86) and chronic pancreatitis (5 cases/86). Male patients were in the majority (sex-ratio M/F=1.6) with a mean age of 55.7±14.7 years (16 to 92 years).
Cholestasis syndrome (50%) and abdominal (epigastric) pain were the most common indications. In pancreatitis, the contours were blurred (80%) compared to tumors (56.1%) where they were lobulated ($p<0.05$). In 45% of pancreatitis the peripancreatic fat was infiltrated, against 16.7% in tumors ($p=0.01$). The Wirsung duct was dilated in most tumors compared to pancreatitis where it was irregular with calcifications ($p<0.05$). The tumors were resectable in 26% of cases.
Conclusion: The abdominal CT-scan contributes to the diagnosis of pancreatic pathologies. Tumors are the most found, of which only 1/3 was resectable. It is often a male subject aged >40 years with a clinical indication.

Keywords: abdominal CT-scan, pancreas pathologies

Introduction
Pancreatic pathologies are polymorphic in nature, form and clinical expression, grouping together all the local and general manifestations linked to an anomaly in the functioning of the pancreatic structures. Apart from diabetes mellitus, acute pancreatitis, chronic pancreatitis and tumoral lesions seem to be the best described pancreatic pathologies today [1-7].
The pancreas being a deep organ, its clinical explorations are sometimes limited and inefficient. However, the possibility of exploration of the human body, improved by medical imaging techniques, makes it possible to better study pancreatic pathologies [5].
At the global level, the worldwide incidence of pancreatic diseases is estimated between 19.9 and 64.9 per 100,000 inhabitants [3].
The diagnosis of these pathologies is mainly based on the dosage of pancreatic enzymes (lipasemia in particular) and medical imaging.
Indeed, computed tomography has proven to be very rewarding for the study of silent anatomical areas in conventional radiology and ultrasound. The CT-scan is more sensitive and more specific than the ultrasound but it will only be done as a second intention because it is a heavier and more expensive examination [5].
In the DRC, few studies to our knowledge have been carried out on pancreatic diseases in computed tomography (CT) and because of the low accessibility to modern diagnostic means, pancreatic pathology remains poorly known epidemiologically (underdiagnosed). Our objective was to determine the epidemiological and scanographic profile of pancreatic pathologies in medical imaging departments in Kinshasa.

Materials and Methods
Study framework
This is a multicenter study that included data from 3 hospital structures with at least one medical imaging department including operational CT during our study period. These structures include:
- The MONKOLE hospital center;
- HJ HOSPITAL;
- Le Rocher imaging center

Type and period of study
This is a descriptive documentary study based on the study of reports of abdominal CT-scans having retained a pancreatic pathology in our study environment during a period of 5 years, i.e. from June 6, 2016 to June 6, 2021..

Sampling
Study population
This study includes all reports of abdominal CT-scans having diagnosed pancreatic pathology in the 3 medical imaging departments selected for our study during the above-mentioned period.

Inclusion and non-inclusion criteria
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We retained in our study, the reports of the abdominal scanners the socio-demographic characteristics: the age and the sex; the indication of the abdominal CT-scan and the CT-scan diagnosis retained after examination.

Sample size
Our sample size was n=86. This is a non-probability and convenience sample drawn from an exhaustive population.

Variables of interest and operational definitions
***Age*:** all ages were considered; the patients were grouped by age group, expressed in number of years.
Sex: Both genders were taken into account, i.e. female and male.
The indication of the abdominal CT-scan: clinical, suspicious ultrasound, check-up

Descriptive elements of the pancreas on CT scan
Contours of the pancreas: external limits of the pancreas on CT scan which may be blurred, lobulated, regular.
Size: the estimated CT dimension of the pancreas can be increased, decreased, normal
Density: the density of the pancreas which can be hypodense, isodense, liquid, mixed, tissue
Enhancement: modification of the density of an organ after injection of contrast product, possibly homogeneous, heterogeneous
Parenchyma: heterogeneous, cystic, homogeneous, loss of lobulation, calcification

Necrosis, casting necrosis, infiltration of peripancreatic fat.
CT scan diagnosis: Conclusion of the report

Exploration protocol
All examinations were performed on a Siemens brand scanner. The reading of these scanographic images was made by doctors specializing in medical imaging with more than 10 years of experience.

Le Rocher Imaging Center
At the Le Rocher imaging center, all examinations were carried out on a 16-barette scanner (Satomom FORCE, Siemens Healthcare, Forchheim, Germany, manufactured in 2005) put into service for 5 years.

Description of the procedure and technical parameters
1. **Patient preparation and position**
- Patient on a water diet (two glasses of water just before the acquisition)
- Inspiratory apnea
- Supine position

2. **ii) Description of the procedure**
- Helical acquisition
- Examination volume: from the diaphragmatic domes to the symphysis
- Acquisition without injection of contrast product
- Injection of iodinated contrast product
- Acquisition after injection of contrast product

Five main acquisition times during abdominal exploration in CT
1. **The phase without injection:** Which makes it possible to highlight the presence of calcifications, of a fatty, gaseous, liquid or hematic component within a lesion or a collection, or even the presence of exogenous material (e.g. surgical clips)
2. **The so-called early arterial phase:** acquired 20 to 30 seconds after the injection or ideally as soon as the peak of aortic enhancement is automatically detected: allows optimal visualization of the arterial network, before parenchymal enhancement, it is particularly important for mapping the arterial vascularization, orthotopic liver transplantation or arterial endovascular treatment.

3. **The so-called late arterial phase:** acquired 35-40 seconds after the start of the injection (or at 15-20 seconds automatic detection of the aortic enhancement peak) and makes it possible to highlight lesions which have an essentially arterial vascular supply such as benign hepatocyte lesions, focal nodular hyperplasia and adenoma

Data analysis
The data was entered in Excel 2010 software. They were then exported to SPSS 21 (Statistical Package for social sciences), version 21.0 for processing and analysis. Mean and standard deviation were calculated for symmetrically distributed quantitative data. Relative (%) and absolute (n) proportions were calculated for categorical data. Pearson's chi-square test was performed for comparison of proportions. While the T-student test was used to compare the means. For all the statistical tests carried out, the threshold of statistical significance (p-value) was $p < 0.05$.

Ethical considerations
Data processing took place anonymously and strictly confidentially. The data has been treated fairly.

Results
In our series, a total of 2342 reports of abdominal CT-scans were collected, among which 86 had evoked pancreatic pathologies, i.e. a frequency of 3.7% of pancreatic pathologies seen on CT.

Relative frequency of pancreatic pathologies diagnosed
Pancreatic tumors were by far the most found diagnosis with 62 cases (72.2%); followed by acute pancreatitis with 15 cases (17.4%). Chronic pancreatitis was found in 5 patients (5.8%).

Table 1: Breakdown of patients according to the selected CT diagnosis

Diagnostic	N=86	%
Pancreatic tumor	62	72.2
Acute pancreatitis	15	17.4
Chronic pancreatitis	5	5.8
pancreatic cyst	2	2.3
pancreatic pseudocyst	2	2.3

General characteristics of the study population
The mean age of patients was 55.7 ± 14.7 years with extremes of 16 to 92 years. Most of the patients were over 50 years old, ie 33 patients (38.4%) over 60 years old and 26 patients (30.2%) between 51 and 60 years old. Cholestasis syndrome (50%) and abdominal pain were the most common indications. Tumor and cystic pathologies were the most represented with 66 cases (76.7%).

Table 2: Description of the study population

Variable	All n=86 (%)	Feminine n=33 (%)	Male n=53 (%)	p
Age in years (X±SD)	55.7±14.7	57.9±13.2	54.3±15.5	0.09
≤20	1(1,2)	0	1(1.9)	0.56
21 – 30	3(3.5)	1(3)	2(3.8)	0.85
31 – 40	10(11.6)	2(6.1)	8(15.1)	0.20
41 – 50	13(15.1)	4(12.1)	9(17)	0.54
51 – 60	26(30.2)	13(39.4)	13(24.5)	0.14
≥61	33(38.4)	13(39.4)	20(37.7)	0.51
CT scan indications				
SD of cholestasis	47(54.7)	20(60.6)	27(51)	0.62
Abdominal pain	31(36)	9(27.3)	22(41.5)	0.12
Suspicious ultrasound	4(4.7)	2(6.1)	1(3.6)	0.35
Abdominal bloating	4(4.7)	2(6.1)	2(3.8)	0.31
Pathologies				
Tumors and cysts	66(76.7)	28(84.8)	38(71.7)	0.13
Pancreatitis	20(23.3)	5(15.2)	15(28.3)	0.16

Indications for abdominal ct-scans
Cholestasis syndrome was the indication for abdominal CT-scan in most cases with 47 patients (54.6%), followed by abdominal pain with 31 patients (36.1%).

Table 3: Distribution of patients according to indications

Indication	n=86	%
Cholestasis Syndrome	47	54.65
Abdominal pain	31	36.05
Abdominal bloating	4	4.65
Suspicious ultrasound	4	4.65

General description

For the vast majority of pancreatitis, the pancreas presented blurred contours (80%) compared to tumor pathologies (28.8%). The difference was statistically significant (p=0.00). On the other hand, the contours of the pancreas with tumor pathologies were lobulated in most cases (56.1%) with a significant difference compared to the contours of the pancreas in both acute and chronic pancreatitis (p=0.03). Pancreas with tumors and cysts showed more increased size compared to patients with pancreatitis (p=0.00). By comparing the density of tumoral and inflammatory pathologies, we did not observe a statistically significant difference (p>0.05). Necrotic lesions as well as calcifications were mainly observed in pancreatitis with a statistically significant difference compared to tumoral and cystic pathologies.

Table 4: General description of pancreatic pathologies on CT-Scan

Variables	Total n=86 (%)	Tumors and Cysts n=66 (%)	Pancreatitis n=20 (%)	p
Outlines				
Blurs	35(40.7)	19(28.8)	16(80)	0.00
Lobules (irregular)	41(47.7)	37(56.1)	4(20)	0.03
Regulars	10(11.6)	10(15.2)	0	0.00
Cut				
Augmented	77(89.5)	61(92.4)	16(80)	0.00
Diminished	4(4.7)	0	4(20)	0.06
normal	5(5.8)	5(7.6)	0	0.08
Density				
Hypodense	50(58.1)	35(53)	15(75)	0.23
Isodense	2(2.3)	2(3)	0	0.08
Fluid	4(4.7)	3(4.5)	1(5)	0.22
Mixed	2(2.3)	1(1.5)	1(5)	0.27
Tissue	28(32.6)	25(37.9)	3(15)	0.13
Enhancement				
NO	34(39.5)	20(30.3)	14(70)	
YES	52(60.5)	46(69.7)	6(30)	0.00
Parenchyma				
Heterogeneous	62(72.1)	54(81.8)	8(40)	0.00
Cystic	1(1,2)	1(1.5)	0	0.13
Homogeneous*	16(18.6)	9(13.6)	7(35)	0.11
Loss of lobulation	7(8.1)	2(3)	5(25)	0.03
Calcification	8(9.3)	3(4.5)	5(25)	0.02
Necrosis	12(14)	5(7.6)	7(35)	0.01
Canal calcification	1(1,2)	0	1(5)	-

*Only normal characteristic of the parenchyma (18.6%)

Peripancreatic Lesions

The peripancreatic fat was affected in 45% in pancreatitis, whereas it was only in 16.7% in tumoral and cystic pathologies with a statistically significant difference (p=0.01). Perilesional edema and fluids were noted in 4.7% and 2.3% respectively. By comparing the different types of lesions, we found no statistically significant difference (p>0.05).

Table 5: Distribution of patients according to peripancreatic **lesions**

Variables	Total n=86 (%)	Tumors and Cysts n=66 (%)	Pancreatitis n=20 (%)	p
Infiltration of peripancreatic fat				
NO	66(76.7)	55(83.3)	11(55)	-
YES	20(23.3)	11(16.7)	9(45)	0.01
Edema				
Absent	82(95.3)	65(98.5)	17(85)	-
Diffuse	3(3.5)	1(1.5)	2(10)	0.03
localized	1(1,2)	0	1(5)	0.12

Injury to The Wirsung Duct And The Bile Tract

The Wirsung duct was dilated in 43 patients (50%), most of them with tumor pathology (p=0.00). While the irregularity of this channel and the presence of calcifications were mainly observed in pancreatitis. The involvement of the bile ducts and the presence of gallstones were widely noted in the tumoral and cystic pathologies (p<0.05).

Table 6: Damage to the bile ducts and the main pancreatic duct

Variables	Total n=86 (%)	Tumors and Cysts n=66 (%)	Pancreatitis n=20 (%)	P
Wirsung Canal				
Dilation				
NO	43(50)	27(40.9	16(80))	-
YES	43(50)	39(59.1)	4(20)	0.00
Irregularity				
NO	85(98.8)	66(100)	19(95)	-
YES	1(1,2)	0	1(5)	0.23
calcifications				
NO	85(98.8)	66(100)	19(95)	-
YES	1(1,2)	0	1(5)	0.23
Canal compression				
NO	75(87.2)	55(83.3)	20(100)	-
YES	11(12.8)	11(16.7)	0	0.04
Biliary				
Bile duct damage				
NO	42(48.8)	24(36.4)	18(90)	-
YES	44(51.2)	42(63.6)	2(10)	0.00
Gallstone				
NO	69(80.2)	49(74.2)	20(100)	-
YES	17(19.8)	17(25.8)	0	0.01

Topography of pancreatic damage

The cephalic pancreas was the most frequent location of pancreatic pathologies with 41 cases (47.7%) followed by damage to the pancreas as a whole (inflammation) with 20 cases (23.3%).

Table 7: Distribution of pancreatic lesions according to topography

Topography	n=86	%
Cephalic	41	47.7
pancreas as a whole	20	23.3
Corporate	12	14.0
caudal	5	5.8
Caudal corporeal	4	4.6
Isthmian	2	2.3
Cephalocorporeal	2	2.3

Discussion

Pancreatic pathologies are diverse and often difficult to diagnose, combining the clinic with clinical biology (lipasemia in particular) and very often with medical imaging, of which the CT-Scan represents the most appropriate means [5, 9], particularly in our environment. of study. Indeed, the pancreas is a deep organ whose exploration essentially requires medical imaging [5]. The objective of this work was to describe the scanographic and epidemiological aspects of pancreatic pathologies in 3 radiology departments in Kinshasa.

In this chapter, we discuss and comment mainly on the epidemiological and CT data reported in our series compared to the literature.

Epidemiological data

The epidemiology of pancreatic pathologies is currently little known, probably due to the unavailability and/or low accessibility to modern diagnostic means in particular [10]. In our series, a total of 2342 reports of abdominal CT-scans were collected, among which 86 had mentioned at least one pancreatic pathology, i.e. a prevalence of 3.7%. This result is much lower than that reported by Biwole MS et al. [6] who found a prevalence of 10.5% in 2016 in Cameroon. This difference could be explained by the fact that this author recruited a large number of patients whose indication for the abdominal CT-scan was an ultrasound already suspecting a pancreatic pathology (16.7%) whereas in our study, only 4, 7% of abdominal CT-scans were indicated following an ultrasound suspecting a pancreatic pathology.

In addition, it is important to point out that in our environment, for socio-economic reasons, the diagnosis of certain pancreatic pathologies, whatever requiring an abdominal CT-scan (even if only to evaluate the prognosis or the severity) obtain their confirmation by a biology made of lipasemia and an ultrasound simply without resorting to CT.

Relative frequency

Pancreatic tumors were by far the most common pathologies in 72.2%; followed by acute pancreatitis in 17.4% and chronic pancreatitis in 5.8%. While cysts were found in 4.6%. Although with certain discrepancies, our results are largely superimposable with what is reported in the literature [9-17].

This predominance of pancreatic tumors could be explained by the fact that most tumoral lesions of the pancreas develop quietly and are diagnosed late, when the obvious clinical, biological and radiological signs of the disease appear. Also, just with a lipasemia >3 times normal and a typical clinic, the diagnosis of pancreatitis can be established, whereas this is not always obvious in tumoral lesions for which the use of imaging remains the best means. more plausible diagnosis [1, 5].

Sociodemographic characteristics

In our series, the age of the patients varied from 16 to 92 years with an average of 55.7 ± 14.7 years. Male and female subjects were all represented, with an M/F sex ratio of 1.7. The mean age was 57.4±14.9 years for tumors and 50.2±12.6 years for pancreatitis. We therefore notice that the subject of more than 50 years of male sex is predominant in our series. This observation was also made by Biwole MS et al [6] who found an M/F sex ratio of 1.6 and an average age of 50.2±14.

On the other hand, as with other cancers, only less than 10% of cases of pancreatic cancer occur in individuals under the age of 55, and the median age of onset is 71 years [17]. The mean age for pancreatic tumors was 57.4 ± 14.9 years in our series. This discrepancy is justified by the fact that we also included benign tumors in our study.

Clinical context and indication

In our study, 95.3% of CT indications were made of a clinical orientation, including cholestasis syndrome in 50%, abdominal pain and only. Only 4.7% of patients came for suspected pancreatic pathology on ultrasound. These results corroborate those of Biwole MS et al [6] who found 81.4% clinical indication and 16.7% ultrasound orientation. This large predominance of clinical indication is justified by the fact that apart from pathologies of the endocrine pancreas (diabetes mellitus in particular) whose diagnosis seems to be common in the medical community, the diagnosis of pancreatic tumors and pancreatitis is complex, and requires in most cases radiological exploration and enzymatic assay.

Aspects of the gland and the condition of the ducts

The vast majority of inflamed pancreases had blurred contours (80%) compared to tumor pathologies (28.8%) with a statistically significant difference (p=0.00). On the other hand, the contours of pancreas with tumor pathologies were lobulated in most cases (56.1%) with a significant difference compared to pancreatitis (p=0.03).

We also noticed that, in our series, the duct of Wirsung was dilated in 43 patients (50%), most of whom had a tumor pathology (p=0.00). While the irregularity of this channel and the presence of calcifications were observed mainly in patients with pancreatitis. The involvement of the bile ducts and the presence of gallstones were widely noted in the tumoral and cystic pathologies (p<0.05). These results agree with what is reported in the literature [1, 2, 7].

Our results can be superimposed on those of Atif Zaheer et al [16] who found in patients with histologically confirmed pancreatic cancer, a focal mass (78%), pancreatic duct dilation upstream of > 5 mm from the mass (69%) and parenchymal atrophy (53%).

Indeed, pancreatic adenocarcinoma typically results (in 85 to 95% of cases) in a hypodense mass, often lobulated, after injection of iodinated contrast product. In 5 to 15% of cases the lesion is iso dense to the pancreas and therefore not directly visible [1]. The indirect signs depend on the site of the lesion: these signs result from the consequences of the tumoral obstacle: dilation of the intra- and extra-hepatic bile ducts, dilation of the main pancreatic duct, pancreatic parenchymal atrophy upstream of the tumor [1, 2, 7].

Parenchyma and necrosis

Parenchymal damage was noted in 81.4% of cases. Necrotic lesions as well as calcifications were mainly observed in pancreatitis with a statistically significant difference compared to tumoral and cystic pathologies. Without specifying which ones, Biwole MS et al reported a 99% frequency of parenchymental lesions.

Peripancreatic lesions

The peripancreatic fat was affected in 45% in pancreatitis, whereas it was only in 16.7% in tumoral and cystic pathologies with a statistically significant difference (p=0.01).

Our results are similar to those of Atif Zaheer et al [16] who found soft tissue infiltration around the superior mesenteric artery and vein in a higher frequency in patients with pancreatic tumor compared to to patients with pancreatitis.
Indeed, it is described in the literature [1, 2, 7] that in CT, the formal signs of vascular invasion by pancreatic adenocarcinoma are as follows: occlusion or thrombosis, a reduction in the caliber of the vessel (stenosis), tissue engulfment over 180° or more of the vessel, even in the absence of a decrease in caliber. These signs are classically accompanied by an contiguity between the pancreatic tumor and the vascular abnormalities.

Conclusion

This study, which aimed to describe the epidemiological and scanographic profile of pancreatic pathologies in Kinshasa, shows that the abdominal CT-scan contributes to the diagnosis of pancreatic pathologies. We noted a prevalence of 3.6% of these pathologies in Kinshasa. Which is close to what the literature reports. Tumor pathologies are the most common, followed by acute pancreatitis. Adult subjects over 40 years old and male are the most affected compared to young people and female subjects. Most often it is a clinical indication for the CT-scan for suspected pancreatic pathology, which implies that most patients consult at an advanced stage of the disease.

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