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Evaluation of CT Scans Reports in Pancreatic Tumors at Ouagadougou (Burkina Faso)

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Abstract

Background: There are no recommendations for the use of standardised CT reports in oncology in our country. The aim of this study was to evaluate CT reports of pancreatic tumors in the city of Ouagadougou. **Materials and Methods:** Descriptive, multicenter, cross-sectional study conducted from 1st January 2013 to 31 December 2021. It concerned CT scan reports from five public and private imaging centers in the city of Ouagadougou. During the study period, 41 reports of pancreatic tumors were collected. We evaluated the reports using the standardized model developed by the Society of Abdominal Radiology and the American Pancreatic Association as a reference. **Results:** CT scan reports were not standardised. The writing style was free. Concerning the lesion, the aspect of the tumor at the pancreatic time was the item with the least information (24.4%). The status of the superior mesenteric artery was mentioned in 17%, the celiac trunk and the portal trunk in 12.2% of cases and 9.7% for the superior mesenteric vein. No report noted the appearance of the common hepatic artery. The status of the lymph nodes, liver and peritoneal cavity was mentioned in all reports. The exact location of the lymph nodes was not specified. The analysis of the reports classified them into two groups: potentially resectable tumours in the absence of secondary locations in 31.7% of cases and locally advanced tumours or presence of metastases in 68.3% of cases. **Conclusion:** The CT reports were not standardized. The items allowing evaluating the loco-regional extension of the tumor were the least specified. This may suggest the high rate of potentially resectable tumours in our study.

1. Introduction

Computed tomography (CT) has a definite interest in tumor mapping, locoregional and distant extension assessment of adenocarcinoma, which is the most frequent solid tumor of the pancreas [1]. Surgical resection is the main therapeutic modality and the only chance of cure for the patient. It is a formidable cancer, with a high mortality rate due to its often-late discovery, often contraindicating any surgery due to frequent loco-regional and distant extension.

Resectability criteria have been established based on the elements provided by the CT scan. The CT report from this examination provides arguments for the surgeon and the oncologist to decide on the course of treatment. However, in imaging, the reports may be structured or not. The risk in the case of non-structured reports is that important items are forgotten. Brook *et al.* [2] have shown that surgeons were more confident about the results of structured reports, allowing a better planning of the surgical gestures.

Since patient survival is the same for resection in a macroscopic tumor area as for an unoperated patient, it is important to carefully select candidates for surgery.

In the United States, to improve the therapeutic management of patients, the Society of Abdominal Radiology and the American Pancreatic Association have proposed a standardized reporting format for pancreatic adenocarcinoma [3].

In Burkina Faso, there is still no harmonization of reports, especially in oncology. Ouattara *et al.* [4] in a monocentric study showed a low rate of completeness of reports concerning the evaluation of pancreatic cancers.

We therefore wanted to evaluate CT scan reports during the exploration of pancreatic tumors in the city of Ouagadougou, in the light of international standards, through a multicenter study.

2. Patients and Methods

This was a descriptive cross-sectional study conducted from January 1st 2013 to December 31 2021. The study was multicenter and involved CT reports from five public and private imaging centers in the city of Ouagadougou.

The sampling was exhaustive. It included all complete reports available in the computerised archiving system of these health facilities. The report was considered complete if it included a patient identity, indication, technique or protocol, results and conclusion. Incomplete reports were not included. During the study period, 41 reports of pancreatic tumors were found and collected in the computerised archiving system of these structures.

The data for each report was collected on a form. We considered the standar-

dized model of the CT report of pancreatic ductal adenocarcinoma proposed by the National Comprehensive Cancer Network (NCCN) as a reference model [5]. The presence or absence of the following variables was noted from the reports at our disposal.

- Socio-demographic data of the patients concerned by the reports: age, gender
- Clinical indication;
- The technique used for the examination mentioned on the report: injection phases, type of device, thickness of the sections;
- The pancreatic lesion:
○ Tumor appearance at pancreatic time, size, location;
○ Appearance of the main pancreatic duct: dilated or not:
○ Bile duct appearance: dilated or not:
- Arterial assessment
○ Superior mesenteric artery (SMA), celiac trunk, common hepatic artery: presence or not, tumor contact or infiltration greater or less than 180˚, focal narrowing or irregular contours:
○ Presence of arterial variant or not;
- Venous evaluation
○ Portal vein, superior mesenteric vein (SMV): presence or absence or occlusion. Extension to the 1ère drainage vein of the SMV: presence or absence, tumor contact or infiltration greater or less than 180˚, focal narrowing or irregular contours
○ Presence of thrombus or collateral veins.
- Extra pancreatic extension
○ Liver: presence or absence or doubt about a lesion
○ Peritoneal nodules: presence or absence
○ Ascites: presence or absence
○ Suspicious nodes: presence or absence (portal vein, celiac region, splenic vein, para-aortic node, aortocaval)
○ Invasion of neighborhood structures
○ Ganglionic: local regional nodes, distant nodes

From the CT descriptions, the lesions were divided into according to the NCCN criteria in:

- A priori resectable tumor: absence of arterial or venous vascular involvement; venous involvement less than 180˚, without irregularity of caliber.
- Borderline tumor: venous involvement of less than 180˚ with irregularities in caliber, venous involvement of more than 180˚, arterial involvement of less than 180˚. In this case, there is a high risk of resection in a microcopic tumor zone (R1). Treatment with chemotherapy and/or neoadjuvant radiotherapy is proposed.
- Locally advanced unresectable tumor: presence of venous thrombosis, jejunal veins and/or arterial involvement greater than 180˚ (AMS or TC) or presence of metastases. Palliative treatment is therefore considered.

Ethical considerations. The authorization of the management of the different

health care centers was obtained. Patient anonymity and data confidentiality were respected.

Data Analysis. Data were processed with Word and Excel version 2019 software. Data analysis was performed with STATA software.

3. Results

Socio-demographic data of the patients concerned by the reports (Table 1). There was a male predominance, with 61% of subjects (n = 25) and a sex ratio of 1.56. The mean age of the patients was 63 ± 15 years [25 - 90].

General appearance of the CT report. The reports had a mean length of 28 lines, with extremes of 13 and 51 lines. There was no standardization of content, especially in the results section. The writing style was free. They were all structured in four parts after the socio-demographic data: indication or clinical information, protocol or exploration technique, results and conclusion.

Data on the protocol or exploration technique. One report out of 41, *i.e.* 2.4%, had no descriptive element of the examination technique performed. The thickness of the sections was specified in 3 reports (7%). No report mentioned the quantity and concentration of the iodinated contrast medium, the injection rate or the characteristics of the CT machine.

Morphologic evaluation of the pancreatic tumor. The location and size of the pancreatic lesion were the most mentioned items, respectively in 100% and 97.56% of the cases. The appearance of the tumour lesion on pancreatic time was mentioned in 24.4% of cases. Mention of the aspects of the pancreatic lesion is noted in Table 2.

Arterial evaluation (Table 3). The notion of arterial contact less than or greater than 180˚ was mentioned in one report. There was no mention of focal narrowing or irregularity of arterial contours noted. Extension to the superior mesenteric artery was noted in 17% of cases. There was no mention of the common hepatic artery. The arterial anatomic variant noted involved a common origin of the celiac trunk and superior mesenteric artery.

Venous evaluation (Table 4). The notion of veinous contact less than or greater than 180˚ was mentioned in one report. There was no mention of focal narrowing or irregularity of venous contours noted. The most common venous extension was to the portal vein and superior mesenteric vein in 12.2% and 9.7% of cases respectively.

Extra pancreatic involvement. Extension to neighbouring pancreatic structures was mentioned in 17% of cases. Distant extension (liver, peritoneal) was mentioned in all reports. Extra pancreatic involvement of the lesion is described in Table 5.

NCCN's classification. According to the classification of the NCCN, the items mentioned in the reports made it possible to classify the tumours into two groups: unresectable tumours in 68.3% of cases and resectable tumours in 31.7% of cases (Table 6). The items in the reports did not allow the tumours to be classified as borderline tumours.

Table 1. Characteristics of patients from the files reviewed (N = 41).

Characteristics	Frequency	Percentage (%)
Age: 63 ± 15 years [25 - 90]		
Sex (N = 41)		
Male	25	61
Female	16	39
Average size of the tumor: 50 ± 32 mm		
Location of the tumor (N = 41)		
Right pancreas	32	78.05
Left pancreas	9	21.95
Indications		
Abdominal mass	20	48.78
Abdominal pain	11	26.83
Ictère	10	24.39
Location of metastasis (N = 25)		
Liver	19	46.34
Peritoneum	14	34.15
Adrenal gland	5	12.2
Lung	3	7.32
Stomach	2	4.88
Duodenum	1	2.44
Kidney	1	2.44

Table 2. Mention of the appearance of the pancreatic lesion (N = 41).

Mention of the appearance of the pancreatic lesion	Frequency (N)	Percentage (%)
Appearance at pancreatic time	10	24.4
Size	40	97.6
Location	41	100%
Aspect of the main pancreatic duct	33	80.5
Aspect of the bile ducts	33	80.5

Table 3. Mention of arterial involvement.

Mention of arterial involvement	Frequency (N)	Percentage (%)
Superior mesenteric artery	7	17
Celiac trunk	5	12.2
Common hepatic artery	0	0
Presence of anatomical variants	7	17

Table 4. Mention of venous involvement.

Mention of venous damage	Frequency (N)	Percentage (%)
Portal vein	5	12.2
Superior mesenteric vein	4	9.7
Presence of thrombus	4	9.7
Presence of collaterals	0	0

Table 5. Mention of extra pancreatic involvement.

Mention of extra pancreatic involvement	Frequency (N)	Percentage (%)
Liver	41	100
Peritoneal nodules	41	100
Ascites	41	100
Suspicious nodes	41	100
Invasion of neighborhood structures	7	17

Table 6. Distribution of reports according to the NCCN classification.

Classification	Frequency (N)	Percentage (%)
Resectable tumors	13	31.7
Borderline tumors	0	0
Unresectable tumors	28	68.3

4. Discussion

This study highlighted that CT scan reports for pancreatic tumor exploration in the city of Ouagadougou, had many missing items compared to the reference model and were not standardized [3]. There was no standardization of the models used within the same center. The writing style was free.

The protocols for performing the examination, the type of apparatus and the thickness of the slices for the exploration of the pancreatic tumor are crucial elements to be informed, which guarantee the quality of the exploration performed. The acquisition at pancreatic time must be performed between the arterial and venous times, between 40 and 50 s. The concentration of iodine contrast medium must be greater than 300 mg/ml, with a flow rate of 3 to 5 cc/s. The exploration is performed in thin sections (0.75 to 3 mm). Maximum Intensity Projection (MIP) reconstructions can be performed for a better analysis of the vessels [7].

CT scan is the gold standard for analysis of a pancreatic tumor [8]. It allows the surgeon to search for and describe elements that will allow him to consider resection of the tumor while minimizing the risks of incomplete resection [9].

Concerning the pancreatic tumor, the appearance of the lesion at pancreatic time was the least mentioned (24.4%). However, this is an important element to be notified. Pancreatic time allows maximum enhancement of the gland and in-

creases the visualization of the tumor. Adenocarcinoma, which is by far the most frequent solid pancreatic malignancy, has a hypodense appearance on pancreatic time in 95% of cases [10]. We are in a context where echo-endoscopy is not available to obtain a histological diagnosis of certainty before surgery in the presence of a pancreatic tumor. The description of the lesion is therefore very important. Indeed, a differential diagnosis can be made with pancreatic tuberculosis [11] [12]. CT can therefore be used to carry out a local and distant extension assessment of a lesion considered malignant until proven otherwise.

Items such as arterial and venous vascular extension were rarely mentioned in the reports. The presence of tumor extension to the MSA and celiac trunk was mentioned in 17% and 12.2% of cases. No report mentioned the appearance of the common hepatic artery.

Venous extension was also rarely mentioned: 9.7% for the VMS and 12% for the portal trunk. In all cases, whether for arterial or venous evaluation, the notion of contact greater than or less than 180° was mentioned in only one report. No deformation or irregularity of the vessel wall was found.

Mention of the presence or absence of anatomical variants was poorly noted (17%) and no report described the common hepatic artery, which is subject to variations in origin and can have serious consequences if not recognized. Esen *et al.* [13] described the intraoperative discovery of a right hepatic artery arising from the gastroduodenal artery. They noted that non-vessel-based imaging detected only 60% - 80% of anatomical variants. Sebben *et al.* [14] noted a hepatic artery variant rate of about 40% of their sample. Zaki *et al.* [15] noted a rate of anatomical variants of the hepatic artery in 26.2% of cases. Failure to recognize these variants can lead to severe disorders of the liver vascularization after pancreatic cephalic end surgery. Indeed, Yamaguchi *et al.* [16] noted a rate of 93% of intraoperative anatomical variants mentioned on preoperative imaging studies. These were essentially the birth of a right hepatic artery from the gastroduodenal artery in 3.5% of cases, the presence of a right and left hepatic artery in 2.1% of cases and a common hepatic artery arising from the superior mesenteric artery in 1.2% of cases.

The presence or absence of ascites, carcinosis nodules and liver involvement was noted in all cases, as well as the presence of suspicious looking nodes (nodes greater than 10 mm minor axis). However, the location of the adenomegaly was often unclear. However, the classification of the tumor is modified according to the location of the suspicious nodes. While peripancreatic nodes are classified as N+, those located in the aortocaval and para-aortic regions are considered as distant metastatic locations. Imai *et al.* [17] underlined the difficulty of detecting invaded nodes preoperatively on morphological criteria. They noted a rate of 8.5% of invaded nodes not retained on imaging because of the size criteria. They did not demonstrate retrospectively a significant difference between invaded and non-invaded nodes, considering the measurement of small axes, large axes, average axes and volume.

The accuracy of each of these items in the CT report is crucial to optimize the

surgical management of the patient and to obtain healthy margins on histology (R0). When the surgeon moves to the macroscopic tumor zone (R2), the patient's survival is identical to that of a non-operated patient. Studies have shown that clinicians expect radiologists to provide structured, reproducible and understandable reports [2]. Imagery-based narrative styles can create ambiguity for the correspondent [6]. These constants have led to the development of standardized reports by several organ societies.

Criteria for resectability of non-metastatic pancreatic tumors on CT have been stated by the MD Anderson Cancer Center (MDACC) and the NCCN [5]. These systems are based on the TNM classification to classify nonmetastatic patients as resectable tumor, borderline tumor, unresectable tumor.

In our study, 68.3% of the tumours were formally unresectable, with lymph node or distant metastatic localisations. Taking into account the items filled in, it was impossible to establish an objective rate of potentially resectable tumours or borderline tumours. These unresectable rates are lower than several series, noting an unresectable rate of about 80% [9] [18] [19]. Our results are probably due to the inaccuracy of the reports, underestimating this rate. In addition, studies carried out in Burkina Faso had noted very low rates of resectability of pancreatic tumours, probably linked to the diagnosis and late management of patients: 6% by Sanou *et al.* [20], 15% by Koura *et al.* [21] and 2.5% by Bambara *et al.* [22].

It would be wise to retrospectively evaluate postoperatively patients who have had a pancreatic tumour resection to establish radio-histological correlations of pancreatic tumours.

Our study had some limitations that should be noted. There was a low number of available reports due to frequent loss of computerized data and the absence of dedicated and secure archiving systems. However, this study showed that the reports were not comprehensive and were not structured.

5. Conclusions

The CT scan report, which the surgeon refers to for tumor classification and planning of the procedure, was incomplete and unstructured. It lacked vital information, in particular vascular and lymph node involvement, which assesses the loco-regional invasion of the tumor.

The promotion and use of a structured and comprehensive reporting template by radiologists may allow CT to be more efficient in the preoperative workup of pancreatic tumors.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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