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### RESEARCH ARTICLE

#### CONTRIBUTION OF ENDOSCOPIC ULTRASOUND IN PANCREATIC MASSES

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#### Abstract

Endoscopic ultrasound (EUS) is a method of exploration of the digestive system that combines two techniques: endoscopy and ultrasound. EUS has several applications in digestive pathology. Echo-endoscopic biopsy (EEB) of pancreatic masses is a technique that allows fine needle aspiration to obtain material for cytohistological analysis. It is indicated each time a histological examination can have a diagnostic and/or therapeutic interest. For that we realized a retrospective study between January 2017 and December 2020. All patients referred to the department for a bilio-pancreatic echo-endoscopy in the framework of a pancreatic tumor were included in the study. We collected 90 patients who met our inclusion criteria. We recorded the patients' demographics, pathologic history, symptoms, and ultrasound, CT, and EUS. During the echo-endoscopic examination, we always tried to specify some essential data according to the international recommendations, depending on the pathology (benign or malignant).

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#### Introduction:-

Echo-endoscopy (EE) is an imaging technique with a higher resolution power for the examination of the biliary and pancreatic region. This high resolution applies both to the analysis of the ductal network and to the study of the parenchyma [1]. The main interest of the method is that, contrary to all the other imaging techniques currently available for the examination of the pancreas, its performance is inversely proportional to the size of the lesion to be studied: in other words, the smaller the lesion, the better the results and therefore the indication, the larger the lesion, the poorer the results and therefore the indication. In case of suspicion, without clear evidence, of a disease of the pancreas, the EUS is the reference imaging examination to be proposed in priority because it allows to rule out with an unequalled degree of certainty the diagnosis of disease of the pancreas if the parenchyma and the ductal network are normal, or on the contrary to detect an incipient disease which has a great chance of going unnoticed or being of doubtful interpretation, on spiral CT, magnetic resonance imaging (MRI) including pancreato-MRI and wirsunography. Despite advances in imaging, cytology and tumor markers studies, the diagnosis and management of pancreatic masses is a major challenge to practitioners [1]. The objective of our work is to analyze the epidemiological, clinical, radiological and echo-endoscopic characteristics of pancreatic masses for which the decision of echo-endoscopy and cytopuncture has been made in a multidisciplinary consultation meeting and to Specify the diagnostic cost-effectiveness of this technique

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## Materials and Methods:-

We performed a retrospective study between January 2017 and December 2020. All patients referred to the department for biliopancreatic echo-endoscopy for clinical and radiological suspicion of a pancreatic tumor were included in the study. We collected 90 patients who met our inclusion criteria. We recorded the patients' demographics, pathologic history, symptoms, and ultrasound, CT, and EUS. During the echo-endoscopic examination, we always tried to specify some essential data which are the size and the localization, the arterial and loco-regional invasion according to the international recommendations, and this according to the pathology (benign or malignant)

## Results:-

### 1-Profile of patients

The average age of our patients was 63 years (55-81 years). The male sex was slightly predominant with a sex ratio of 1.17.

### 2-Clinical and biological data

Abdominal pain was the most frequent clinical sign with a percentage of 92%, icterus was present in 47% of patients. It was intense cholestatic with disabling pruritus in 37% of patients, alteration of the general state was the third symptom with a percentage of 45% and fever was only present in 3%.

Overall number	90
Average age	63 years old
Sex Ratio (M/F)	1.17
Symptomatology: - Abdominal pain: - AEG : - Icterus: - Fever :	92% 45% 47% 3%
Biological cholestasis	45%
Tumor markers	47%

**Table 1:-** Illustrating the epidemiological characteristics.

### 3-Radiological data

#### 3.1 - Comparison between EUS and ultrasound

The results of the explorations carried out on the same patients, suffering from a bilio-pancreatic pathology, by transcutaneous ultrasound and endoscopic ultrasound, allowed us to note the following observations

43 ultrasound scans showed dilatation of the intra and/or extra hepatic bile ducts without visible obstruction. The ultrasound was able to detect 22 cases of pancreatic tumors and the rest were normal. These results were confirmed by endoscopic ultrasound in 92% of cases. On the other hand, EES was able to detect 31 cases of pancreatic or biliary tract tumor, ultrasound identified only 18.

#### 3.2- Comparison between EUS and CT

A similar treatment was applied to the population of beneficiaries of both CT and EUS, which numbered 90, 46 cases had pancreatic tumors according to CT. Cephalic locations were predominant with a frequency of 78%, corporal locations in second place with a frequency of 22%, The EUS confirmed only 32 with cephalic locations in 68%, and corporal locations in 29%. The rest were divided between ampullomas (11 cases), 19 cases of benign

lesions distributed on serous cystadenoma (4 cases), false cyst of the pancreas (6 cases), chronic calcifying pancreatitis (6 cases), cysts of the pancreas (3 cases) and normal echo-endoscopy (25 cases).

Among the 11 cases, identified by EUS as ampulla of vater 8 of them were diagnosed on CT, The individual cases of calcifying chronic pancreatitis, identified by EUS were considered normal on CT. Taking the result of the EES as the reference diagnosis, the error rate of the CT scan for solid pancreatic tumors can be considered to be about 20%, taking into account these results.

#### 4-Echoendoscopy results

The following characteristics were determined by the EUS:

##### -Tumor location:

Cephalic locations were predominant with a frequency of 68%, corporal locations in second place with a frequency of 29%.

##### -Echogenicity of the tumor:

Heterogeneous tumors presented 94.25% of cases. Hypoechoic 84%, anechoic 33%, hyperechoic tumors represented 96.5% of cases.

##### -Tumor contour:

Tumors with irregular contours accounted for 86.20% of cases.

##### -Tumor size in cm:

Tumor size between 3 - 6 cm was the most frequent with 82.8%. 17.2% of the patients had a tumor size less than or equal to 2 cm diagnosed only by EUS and not seen on the other imaging studies that preceded the indication of EUS.

##### -Vascular invasion on EUS:

Venous invasion on EUS concerned 39 patients, i.e. 45% of all our patients studied.

##### -Arterial invasion:

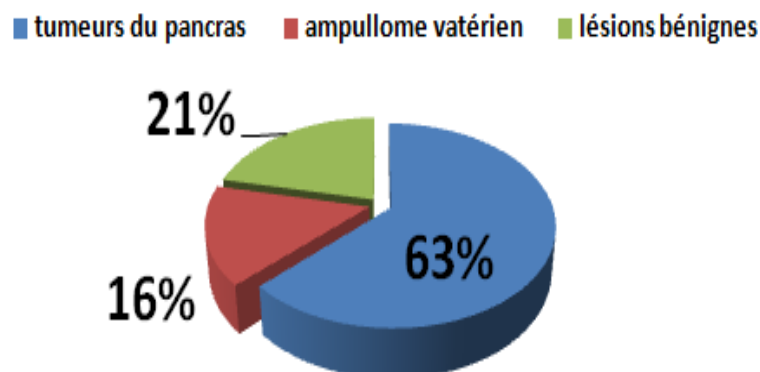
Arterial invasion on EUS was found in 33 patients, i.e. 38% of all the patients studied.

##### -Cytopuncture:

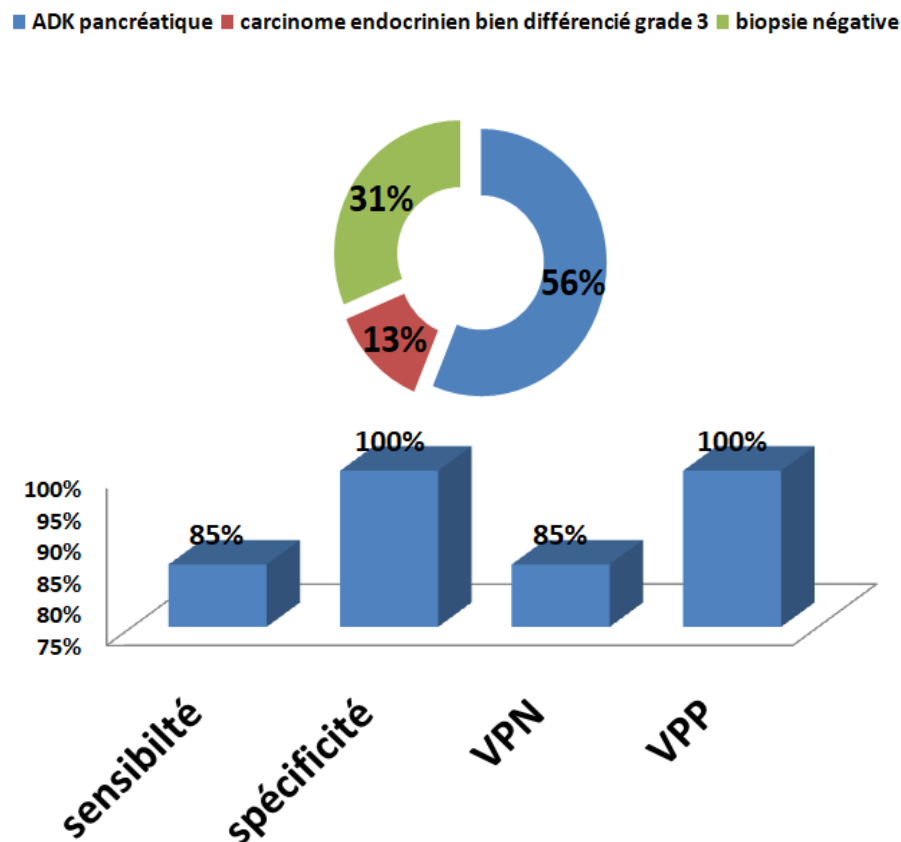
Cytopuncture under echo-endoscopy of pancreatic masses was performed in 33 patients after eliminating contraindications (blood flow disorders by a blood count to evaluate the platelet count and by the prothrombin level). It concerned adenopathies in 2 patients, using a 19 or 22 gauge needle and aspiration with a 20 ml syringe. Two passes were performed in 91% of cases. No complications related to the procedure were noted.

We noted a predominance of malignant tumor pathology with 42% divided into four categories: 32 cases of pancreatic tumors, 11 cases of ampullomas, 19 cases of benign lesions (cystic, cystadenomas, chronic pancreatitis). The sensitivity of EUS in the diagnosis of pancreatic cancer is 85%, the specificity 100%. The positive and negative predictive values are respectively 100% and 85%.

Diagram 1: Pancreatic mass distributions



**Diagram 2: Anatomopathological results of the cytopunction**



Malignant lesions were found in 80% of the cases of all the patients studied, the most represented histological type was pancreatic adenocarcinoma with a percentage of 64%. a well differentiated endocrine carcinoma grade 3 in 4 patients were noted in 3.52% of cases. An immunohistochemical complement was requested in 5.88% of patients, for poorly differentiated carcinomatous processes. In addition, 1 case of lymph node tuberculosis was described on cytopunctions of peripancreatic adenopathies. The histological study was inconclusive in 30% of all fragments reported.

### 5- Impact of echo-endoscopy management

EUS plays a very important role in pancreatic cancer. Its interest is indisputable for the diagnosis and for the extension assessment of cancers considered operable. It should be noted that surgical resection is currently possible in only 10 to 15% of cases [1]. Pancreatic cancer presents on EUS as a hypoechoic mass with irregular contours, heterogeneous content and usually dilatation of the proximal pancreatic duct. In our series, we diagnosed 32 cases of pancreatic cancer by echo-endoscopy. The sensitivity of EUS in the diagnosis of pancreatic tumors is 85%; the specificity reaches 100%. The positive and negative predictive values were respectively 100% and 85%.

In the literature, some studies have found that the diagnostic reliability of T-stage (tumor infiltration) by EES is 80% [1]. The sensitivity of EUS in the detection of pancreatic cancer exceeds 95%. However, this sensitivity depends on the experience of the operator. The specificity is limited, especially if inflammatory lesions exist at the same time, and is about 80%. The main cause of error is represented by localized pancreatitis nuclei[1]. The EUS allows the assessment of operable pancreatic cancers, which are lesions smaller than 4 cm, diagnosed by conventional examinations, without known metastases, in patients without contraindications to surgery. Also, EUS is the most sensitive examination for the detection of small pancreatic cancers, including lesions smaller than 10 mm [1]. However, this ability to detect centimetric tumors has raised the problem of the specificity of these nodular lesions, especially on pancreas already remodeled from chronic pancreatitis

**Discussion:-**

During the course of the study, we had 90 patients who underwent EUS for suspicion of a pancreatic mass

Pancreatic cancer is predominantly a cancer of the elderly: more than half of the cases are diagnosed after 75 years of age in a SEER study published in 2003 [2]. In our study, the age group 55 to 81 years was the most represented with a percentage of 60% and an average age of 65 years. This average age is comparable to that of the European authors [3] but significantly different from that of the African authors who reported an average age of 58 years. In any case, it is established that the risk of pancreatic cancer increases with age [2]. There is a clear male predominance with a sex ratio was 1.5 to 2.4 [2]. In our study, the male/female sex ratio was 1.17, which is in line with the data in the literature from several studies

**A. Clinical aspects :**

1. According to the general signs: Weight loss was the most represented general sign with a percentage of 45%, which is consistent with the results of European authors with 58.13% of cases and African authors with 81.82% of cases [4]. The predominance of weight loss in most studies confirms the delay in diagnosis of this tumor. 2. According to functional signs: In our study, abdominal pain was the most represented functional sign with 92% of cases, which was noted in European works with 75, 11% [3] and in African works [4] with 77.3%. These data allow us to say that the first symptoms during pancreatic cancer are non-specific. 3. According to physical signs: Icterus was the most common physical sign in our patients with a percentage of 47%. The predominance of hepatomegaly was noted in European works [3], while abdominal mass was the physical sign frequently found in African authors [4].

**B. Morphological aspects of pancreatic cancers:**

The main goal of imaging will therefore be to make an assessment of the extension of the disease as precise as possible in order to differentiate patients who can benefit from curative treatment (surgical resection) from those who require palliative treatment (essentially chemotherapy) [5]. If ultrasound does not show the pancreas well (20% of cases) or does not allow the tumor to be seen, the radiological diagnosis is based on spiral CT with injection and EES. Spiral CT should be preferred in the first instance to echo-endoscopy because it is not invasive and allows better exploration of the entire abdomen (especially the liver) in search of metastases. Its sensitivity is 90% for the diagnosis of pancreatic cancer [6]. However, 20% to 30% of pancreatic cancers with a diameter of 2 cm or less are not recognized by this examination. In this case, echo-endoscopy should be performed because its sensitivity is independent of the tumor size [6]. In our study, CT was performed in 92% of our patients before the indication of echo-endoscopy, which confirms that SEA is nowadays a third-line examination after ultrasound and spiral CT. The typical echo-endoscopic appearance of a pancreatic adenocarcinoma is that of a hypoechoic formation with irregular boundaries and coarse echostructure [7]. In our study, EES showed a hypoechoic lesion in 94.25% of the cases, heterogeneous in 84% of the cases and with irregular contours in 86.6% of the cases studied.

However, echo-endoscopy is currently the best examination for the diagnosis of small tumors (< 2 cm in diameter) of the pancreas. Its sensitivity is superior to that of CT, percutaneous ultrasound and MRI [7]. Regarding the diagnosis of pancreatic tumors, two studies have shown that echo-endoscopy is superior to spiral CT for the diagnosis of small tumors less than 2 cm in diameter: The first one is that of Midwinter et al [8] who compared spiral CT with echo-endoscopy in 58 patients. This study shows that echo-endoscopy is more accurate for the diagnosis and localization of pancreatic tumors less than 2.5 cm in diameter. The second study is that of Bender et al [8] who performed linear echo-endoscopy in 65 patients suspected of having a pancreatic lesion on helical CT. The echo-endoscopy confirmed the existence of a pancreatic lesion in 33 patients and found a normal pancreas in the other 32. These results were compared with the data from surgical exploration. In this study, the specificity of echo-endoscopy for the diagnosis of pancreatic cancer was found to be significantly higher ( $p < 0.005$ ) than that of helical CT (88% vs. 41%). In our study, among 90 patients, EUS objectified the existence of a small pancreatic lesion < 2cm in 15 patients not seen on CT.

EUS is essential for the diagnosis and assessment of locoregional extension of small pancreatic cancers (less than or equal to 2 cm in diameter), when ultrasound, spiral CT or MRI have ruled out large tumors with metastatic or locoregional extension. It is also the first examination to be proposed in case of suspicion of pancreatic or duodenal endocrine tumor, because its sensitivity exceeds 90% for the diagnosis of localization of insulinomas, and because in association with somatostatin receptors, it exceeds 90% for the diagnosis of localization of gastrinomas. The sensitivity and negative predictive value (NPV) of EUS for the diagnosis of pancreatic cancers exceeds 95%,

including for small tumors with a diameter of less than 2 cm. These performances remain superior to those of other imaging techniques, including the most recent ones, such as multi-bar CT (10% of undetectable cancers), MRI or PET. The latter two are, to date, inferior to multi-bar CT. This superiority of EES is corroborated by its performance in the detection of small pancreatic tumors, which are not detected by the other explorations [9]. However, EES has limitations: - It may ignore a carcinomatous graft on chronic pancreatitis, especially if it is calcifying, but it may also fail to detect a tumor at the origin of a severe acute pancreatitis if it is performed too early compared to the onset of the complication. It is therefore important to know how to repeat the examination, a second or third time in the following weeks, if the suspicion of associated cancer persists.

The characterization of a mass remains a problem. If a hypoechoic appearance with poorly limited irregular contours argues for adenocarcinoma, or if a well-limited nodule with little hypoechoic posterior enhancement suggests an endocrine nature, no criterion is sufficiently specific to make a diagnosis of nature or to formally exclude a benign pathology. Elastography and contrast echo-endoscopy, two conceptually attractive new techniques, can help characterize a mass by its hardness and hypo vascularization respectively. Puncture under EES allows a cyto-histological diagnosis of cancer with a high sensitivity [10]. To summarize, the specificity of echo-endoscopy for the diagnosis of pancreatic tumors is better than the other examinations and increases even more if guided biopsy is added.

### Conclusion:-

Bilio-pancreatic echo-endoscopy in pancreatic cancer is of considerable value both in terms of positive diagnosis and locoregional extension. It is currently the most accurate examination for the diagnosis of small pancreatic tumors less than 2 cm in diameter. The development of guided biopsy under echo-endoscopy has increased the specificity of echo-endoscopy. Our study described the contribution of SEA in the management of pancreatic cancer at the National Institute of Oncology in Rabat. The results of our series are globally comparable to those published by the different series in the literature. Histological evaluation under echo-endoscopy, non-invasive (contrast echo, elastography, confocal) It is under development and evaluation but is not routinely used. Therapeutic echo-endoscopy is also a real future of echo-endoscopy because it allows mini-invasive access to adjacent organs; its place compared to conventional radiological methods is currently the subject of randomized studies. For this reason and despite the extraordinary progress in cross-sectional imaging in recent years, diagnostic echo-endoscopy and echo-endoscopy with echo-endoscopically guided biopsy remain more than ever the body of the technique and its short and medium term future. Finally, nothing will replace the multidisciplinary evaluation of imaging examinations to best orient therapeutic decisions, especially in cases of tumors with borderline operability and it is important to insist on the urgency of an early and adequate diagnosis that will be able to select patients candidates for R0 curative surgery.

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