

Percutaneous Cytodiagnosis of Carcinoma of the Pancreas and Bile Duct

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Fifty-one percutaneous fine-needle aspiration biopsies guided by selective angiography and 57 by percutaneous transhepatic cholangiography (PTC) were performed in 88 patients. Fifty-two of the patients had a tumor localized to the pancreas and 19 a tumor of the extrahepatic biliary tract. In 17 patients the suspicion of neoplasia was possible to rule out. In 60% of the patients with pancreatic carcinoma and in 53% of the patients with biliary duct carcinoma correct cytological diagnosis was obtained. No false positive results were found. The diagnostic reliability was the same under guidance of angiography as PTC. The experience of the examiner markedly influenced the accuracy of the method. Exact correlation between the cytologic and histologic reports was found in cases where representative material was obtained at the aspiration. None of the 108 punctions was followed by complications. Since the method is harmless and has a high success rate especially in experienced hands it is an important adjunct to the management of pancreatic and bile duct lesions.

PREOPERATIVE CYTOLOGIC DIAGNOSIS is of great value in the management of patients with neoplastic disease. Percutaneous fine needle aspiration biopsy has for many years been used extensively in palpable tumors *e.g.* in the breast, lymph nodes, salivary glands and prostate. In 1966 Dahlgren and Nordenström¹ reported fine needle aspiration biopsy of pulmonary tumors guided by fluoroscopy and in 1972 Oscarson et al.⁴ described selective angiography as a guide to percutaneous fine needle aspiration cytodiagnosis of gastric and pancreatic tumors in a small series of patients. Tylén et al. in 1976⁶ reported positive diagnosis in 22 of 29 cases of carcinoma of the pancreas biopsied in conjunction with selective angiography. Since then reports have appeared of pancreatic biopsy with guidance of PTC, ultrasound, and CT-scanning using essentially the same technique.^{2,3,7}

The purpose of this study was to further analyse the diagnostic accuracy and morbidity in percutaneous fine needle aspiration biopsy in the preoperative investigation of patients with tumors of the pancreas and extrahepatic biliary system guided by selective angiography and percutaneous transhepatic cholangiography (PTC).

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Technique

After localization of the lesion by angiography or PTC, the biopsy was performed with a needle 0.9 mm in diameter and 150 mm long. The needle was adapted on a disposable plastic syringe in an adapter permitting single handed manipulation. The biopsy was performed from the abdominal wall in supine position. Local anaesthesia was necessary only occasionally. The needle was during fluoroscopy directed towards the lesion which could exactly be localized by remaining contrast medium in the bile ducts or by injection of additional contrast medium through the PTC or arteriography catheter. The depth of the lesion was recognized by the resistance offered to the needle at its penetration into the tumor mass. If the tumor could not be recognized in this way, either turning the patient to an oblique position or the use of biplane fluoroscopy could establish the exact position of the needle in the lesion. Once in the tumor the needle was moved back and forth within the lesion during maximal aspiration. The needle was then withdrawn after release of suction and the aspirate was carefully smeared out onto one or several glass slides and immediately fixed in absolute alcohol for staining with hematoxylin and eosine. If several slides were obtained, one of these was allowed to air dry after which it was stained by May-Grünwald-Giemsa. It was possible to evaluate the alcohol-fixed slides in the microscope within ten minutes. All the biopsies in the series were performed by the radiologist.

Material

Eighty-eight patients, 45 male and 43 female, admitted to the hospital of Lund during 1974 to 1976, were subjected to percutaneous fine needle biopsy guided by selective angiography and/or PTC because of a suspected tumor of the pancreas or extrahepatic biliary

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TABLE 1. Results of Percutaneous Cytodiagnosis in 71 Patients with Pancreatic and Bile Duct Cancer

Cytological Diagnosis	Definitive Diagnosis		%
	Pancreatic Cancer	Bile Duct Cancer	
Pancreatic cancer	31	—	60
Bile duct cancer	—	10	53
Benign cells	14	6	
Unsuccessful aspiration	7	3	
Total	52	19	

tract. Mean age among men was 61 years (25–89) and among women 68 years (31–85) and mean body weight 66 kg and 58 kg, respectively. Due to nonrepresentative initial biopsy 17 of the 88 patients had more than one biopsy giving a total of 108 examinations. Fifty-one of the biopsies were guided by selective angiography and 57 by PTC.

The tumor diagnosis was verified by findings at operation or autopsy in 71 patients and verified histologically in 53 patients. The tumor was localized to the pancreas in 52 patients and in 19 patients to the extrahepatic biliary tract. In 17 patients the suspicion of neoplasia was ruled out on the basis of operative findings and findings at autopsy and clinical course.

Results

Correct cytological diagnosis was obtained in 31 of the 52 patients with pancreatic carcinoma (60%) and in ten of the 19 patients (53%) suffering from carcinoma of the extrahepatic biliary tract (Table 1). Among all the 71 carcinomas, 31 were correctly diagnosed at the first puncture and 41 including re-puncture, giving a success rate of 58%. In 30 patients tumor material was not obtained. In 20 of these aspirates (smears) only showed signs of pancreatitis or normal pancreatic or liver or ductal epithelial cells and in the other 10 the aspiration was unsuccessful probably due to faulty aspiration technique (Table 1). No false positive cytologic results were encountered in the series. The number of representative specimens was the same with guidance of angiography as with that of PTC (Table 2). The experience of the radiologist making the biopsy influenced the success rate of the investigation markedly (Table 3).

Postive results were obtained in three of the nine

TABLE 2. Positive Cytologic Diagnosis in Connection with Angiography or PTC

	Pancreatic Ca	Biliary Duct Ca
	Angio	19/31
PTC	12/23	6/16

TABLE 3. Influence of Examiners Experience of Percutaneous Fine Needle Aspiration Biopsies on Diagnostic Accuracy in Pancreatic and Bile Duct Cancer

	Correct Diagnosis/ Number of Patients	%
Experienced examiner	29/45	64
Unexperienced examiner	12/26	46

tumors with a diameter of less than 3 cm. An improvement of the results was found with increasing tumor size. Thus, 19 out of 35 tumors between 3 and 6 cm and 19 out of 27 tumors with a diameter of more than 6 cm were correctly diagnosed.

As shown in Table 4 there was exact correlation between the cytologic and histologic examination in cases where representative material was obtained at the aspiration. Also at rechecking, however, the aspirates from 15 patients with benign primary cytologic report were found only to contain benign pancreas, liver and ductal cells indicating that the tumor was not hit at aspiration.

None of our 88 patients subjected to 108 percutaneous punctions experienced subjective discomfort either during or after the procedure. Sixty-two of the patients underwent surgical exploration one week to three months after the percutaneous puncture. In no subject could evidence of intra-abdominal complications such as abscesses or hematoma or even evidence of the aspiration site be found.

Discussion

Percutaneous cytodiagnosis guided by angiography and ultrasound in pancreatic lesions is used with an increasing frequency. Most clinical series hitherto reported are, however, small. The success rate is generally 70–75%.^{3,4,6} The present study comprises 108 percutaneous fine needle aspiration biopsies of the pancreas and bile ducts performed in 88 patients by 14 different radiologists. The success rate in the total material was 58%; among the pancreatic carcinomas 60% were correctly diagnosed as compared to 53% among the biliary tract carcinomas. The experience of

TABLE 4. Comparison Between Cytologic and Histologic Examinations in 53 Patients with Cancer of the Pancreas or Bile Ducts

Primary Cytologic Report	Histologic Report	
	Carcinoma	Insulinoma
Carcinoma	32	
Endocrine tumor	1	1
Benign cells	15	
Unsuccessful aspiration	5	

the examiner influenced the success rate to a great extent. This may explain the higher percentage of non-representative specimens in the present series (Table 1) as compared to previously reported series, in whom one or two radiologists generally had performed the biopsies. The diagnostic accuracy of the cytologic examination was found to be high in cases with representative aspirates (Table 4). Correct diagnosis was made in 22 out of 44 patients with tumors less than 6 cm in diameter in the present material. Out of these patients with positive aspiration biopsy, eight were possible to treat by radical operation.

A cytologic tumor diagnosis in combination with the results of angiography influences the management of the patients in two ways. The selection of patients for radical surgery can be carefully done preoperatively and when angiography suggests that the tumor is not resectable a positive cytologic diagnosis will save the (nonjaundiced) patient an explorative laparotomy. Any procedure that can shorten hospital stay and minimize the discomfort of the patient should be of considerable value in the overall management of the patient. Thus, explorative laparotomy was avoided in 13 of our patients with cytologic cancer diagnosis.

Smith et al.⁵ stated that until a larger experience of morbidity following percutaneous pancreatic fine needle biopsy is available, it is necessary to monitor patients carefully during and after biopsy. Clinical signs of complications were not found following our 108 punctures. Sixty-two patients in the series were

later operated upon and no evidence of complication was found. It therefore seems legitimate to conclude that fine needle biopsy is harmless and that fear of complications should not prevent its frequent use.

The experience of the examiner influences the accuracy of the method and it is therefore recommended that one or two radiologists at every clinic is responsible for this particular type of examination. Furthermore, the frequency of nonrepresentative biopsies probably would decrease if the preparation, staining and evaluation of the cytological specimens routinely was done in direct conjunction with the radiological examination and biopsy allowing immediate repuncture if tumor material was not obtained.

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