LABORATORY DIAGNOSIS OF PANCREATITIS

Pages with reference to book, From 199 To 200

Tests for the diagnosis of acute and chronic pancreatitis can broadly be divided into three categories. The first category consists of the tests of exocrine pancreatic function which comprise of (a) direct stimulation of pancreas e.g., Secretin Test (Dreiling and Hollander, 1948; Dreiling and Janowitz, 1962; Dreiling et al., 1964; Dreiling, 1971) and Secretin-Pancreazymin Test, the later providing the additional information of measurement of pancreatic enzymes compared to the Secretin Test which determines the volume and concentration of bicarbonate in the duodenal juice; (b) Indirect stimulation of the pancrease by various tests. Lundh test meal has proved useful in chronic pancreatitis particularly with associated pancreatic insufficiency and steatorrhoea (Cook et al., 1967; Mottalcb et al., 1973; Waller, 1975) but the test has certain limitations and has also been found by Gyr et al (1975) to be less sensitive than Secretin test in the diagnosis of acute or mild chronic pancreatitis. Tests consisting of acid perfusion into the duodenum resulting into the stimulation of bicarbonate secretion indirectly through endogenous release of Secretin and the tests comprising of duodenal infusion with a mixture of aminoacids, fatty acids, and dextrose resulting in secretion of pancreatic enzymes through the release of pan-creazymin are still investigative although impaired pancreatic enzyme response has been observed in patients with chronic pancreatitis. Recently a new test has been evaluated in patients with chronic pancreatitis which comprises of indirect measure of luminal chymotrypsin by using a synthetic peptide Bz-Ty-PABA. This peptide, after oral administration, is hydrolysed by pancreatic chymotrypsin to liberate para-aminobenzoic acid which is absorbed from the gut and excreted in the urine. Concentration of PABA in urine reflects the chymotrypsin activity and has been found to be significantly lower in chronic pancreatitis than in controls (Arvanitakis et al., 1976; Bornschein et al., 1976; Gyr et al., 1976). Though easy to perform, the test has certain limitations, (c) Tests for indirect measurement of intraluminal digestive products e.g. qualitative examination of steel for fat and meat fibers and quantitative estimation of fecal fat in 72 hours, samples are helpful in the diagnosis of chronic pancreatitis but usually only when 85-90% of the enzyme secretion capacity of the gland has been lost (Di Magno et al., 1973). Fecal nitrogen estimation is used to determine azotorrhoea which is also evident only at a late stage of the pancreatic disease. Estimation of fecal trypsin and preferably chymotrypsin in 24 hours sample of stool is sometimes used as a screening procedure which tends to be low in steatorrhoea. Starch and gelatin tolerance test or radioisotope tests measuring fat digestion have become obsolete.

The second category of the tests utilizes the pancreatic enzymes in various body fluids as a means of diagnosis in pancreatic disorders. Clinical significance of serum amylase has recently been reviewed by Salt Schenker. It is usually elevated in acute or relapsing acute pancreatitis but it may be elevated in other conditions as well and usually marked elevation of serum amylase is found more often in biliary tract disease, perforated peptic ulcer and abdominal trauma than in pancreatitis (Adams et al., 1968; Geokes et al., 1972). Its diagnostic significance is therefore limited, and confirms diagnosis in approximately 75-80% of cases. Urinary amylase levels (Normal range 900-6,000 S.U./24 hrs) alone are significantly influenced by renal excretory function and the test is helpful in the diagnosis of acute pancreatitis only when used in conjunction with other specific tests. Recently the amylasecreatinine clearance ratio has been extensively evaluated as a test of acute pancreatitis. It is shown that renal clearance of amylase is increased than that of creatinine (Levitt et al., 1969) and the ratio of Cam/Cer usually exceeds 6% (7-14%) in acute pancreatitis than the normal range of 1.5%. It is easy to perform and can be utilized to distinguish acute pancreatitis from other conditions associated with hyperamylasemia (Warshaw and Fuller, 1969) but may also be positive in pancreatic carcinoma, diabetic ketoacidosis and burns (Levine et al., 1975). Amylase level is elevated in pleural fluid in case

of exudative pleural effusion associated with pancreatitis and in peritoneal fluid in pancreatic ascites. Several isoenzymes of serum amylase have been identified, measured and utilized in an attempt to enhance the specificity of the test. Serum lipase activity is frequently elevated in acute pancreatitis and parallels the amylase elevation. Liften and coworkers (1974) have experienced lipase elevation in 63% of the patients, amylase elevation in 10% and both enzymes were elevated in 83% of the cases.
Third category comprises of the studies of pancreatic structure. This includes a plain X-ray of the abdomen. In acute pancreatitis it is dia-gnostically helpful in 30-50% of the cases (Clemett, 1967; Stein and Lepanto, 1976) and may reveal "Sentinel loop" of dilated small bowel, or the "colon cut-off sign" or duodenal distension with occasional air-fluid levels. In chronic pancreatitis the pathognomonic finding is pancreatic calcifications which occur in 30-75% of the cases and this finding is rare in pancreatic cancers or benign tumors. Ba-meal series is helpful in the diagnosis of a pancreatic mass showing displacement of the stomach or "C-loop sign". In acute pancreatitis, edema and inflammation of papilla of Vater may give rise to the "papillary sign" on a duodenal film. Hypotonic duodenography using selective infusion of barium into the duodenum after intubation and I.V. administration of glucagon or anticholinergic drugs produces atonis of duodenal walls and permits detailed visualisation of duodenal mucosal changes in extensive inflammatory conditions or tumors of head of pancrease. Diagnostic yield of this procedure has approached 85% (Eaton and Ferrucci, 1973) but the contraindications of anticholinergics should be kept in mind. Pancreatic scan as a diagnostic mean has been found unsuccessful because of high false positive (30 to 40%) and false negative (15%) diagnosis (Ferrucci and Eaton, 1973). Selective angiography of celiac and superior mesenteric arteries is usually indicated in pancreatic cancer and islet-cell tumour. Ultrasonography, a non-invasive procedure, is the procedure of choice in diagnosis of pseudocysts (Stuber et al., 1972; Walls et al., 1975) and their follow up and may provide information about edema and inflammation of the tissue and pancreatic calcifications in acute or relapsing or chronic calcifying pancreatitis. Computed Tomography (CT Scanning) is helpful in detection of pancreatic tumor but its differentiation from inflammatory mass is usually not possible by CT-scan only. Endoscopic retrograde cholangiopancreatography (ERCP) provides a diagnostic information in 60 to 85% of the cases which may be increased by the cytological examination of pancreatic fluid collected from pancreatic duct. The procedure requires skill and the complications have been found to be rare in experienced hands. Recently percutaneous biopsy of the pancrease following localisation of pancreatic tumor by ultra sound (Smith et al., 1975) has been devised to detect the pancreatic cancer.

References

1. Adams, J.T., Libertino, J.A. and Schwartz, S.I. (1968) Significance of an elevated serum amylase. Surgery, 63:877.
2. Arvanitakis, C. and Greenberger, N.J. (1976) Diagnosis of pancreatic disease by a synthetic peptide. A new test of exocrine pancreatic function. Lancet, 1:663.
3. Bornschein, W., Goldmann, F.L. and Otte, M. (1976) Methodische und erste Kliniche Unlersuchungserebnisse mit einem neuen indirekten Pankreasfun ktionstest. Clin. Chim. Acta, 67:21.
4. Clemett, A.R. Examination of the pancrease, in Margulis, Alimentary tract roentgenology. Edited by Margulis, A.R. and Burhenne, H.T. St. Louis, Mosby, 1967, p. 857.
5. Cook, H.B., Lennard-Jones, J.T., Sherif, S.M. and Wiggins, H.S. (1967) Measurement of tryptic activity in intestinal juice as a diagnostic test of pancreatic disease. Gut, 8:408.
6. Di Magno, E.P., Go, V.L.W. and Summerskill, W.H.J. (1973) Relations between pancreatic enzyme outputs and malabsorption in severe pancreatic insufficiency. N. Engl. J. Med., 288:813.
7. Dreiling, D.A. and Hollander, F. (1948) Studies in pancreatic function. I. Preliminary series of clinical studies with the secretin test. Gastroenterology, 11:714.

8. Dreiling, D.A. and Janowitz, D.H. The measurement of pancreatic secretory function, in Ciba Foundation on the Exocrine Pancreas. Edited by de Reuck, A.V.S. and Cameron, M.P. London, Churchill, 1962, p. 225.
9. Dreiling, D.A., Janowitz, D.H. and Perrier, C. The diagnosis of pancreatic disease, in pancreatic inflamatory Disease. New York, Harper and Row 1964, p. 129.
10. Dreiling, D.A. Investigation of pancreatic function, in the exocrine pancreas. Edited by Beck, I.T. and Sinclair. D.G. London, Churchill, 1971, p. 154.
11. Eaton, S.B. and Ferrucci, J.T. Jr. Radiology of pancreas and duodenum. Philadelphia, Saunders, 1973.
12. Ferrucci, J.T. Tr. and Eaton, S.B. (1973) Radiology of the pancreas. N. Engl. J. Med., 288:506.
13. Geokes, M.C., Van Lancker, J.L.V., Kadell, B.M. et al. (1972) Acute pancreatitis. Ann. Intern. Med., 76:105'
14. Gyr, K., Stalder, G.A., Schiffmann, I., Fehr, C, Vonder-schmitt, D. and Fahrlarnder, H. (1976) Oral administration of a Chymotrypsin-Iabile peptide; a new test of exocrine function in man (PFT). Gut, 17:27.
15. Gyr,_K., Agrawal, N.M, Felsenfeld, O. and Font, R.G. (1975) Comparative study of secretin and Lundh tests. Am. J. Dig. Dis., 20:506.
16. Levitt, M.D., Rapoport, M. and Cooperband, S.R. (1969) Renal clearance of amylase in renal insufficiency, acute pancreatitis and neuroamylasemia. Ann. Intern. Med., 71:919.
17. Levine, R.I., Glauser, F.L. and Berk, J.E. (1975) Enhancement of the amylase-creatinine clearance ratio in disorders other than acute pancreatitis. N. Engl. J. Med., 292:329.
18. Liften, L.J., Slickers, K.A., Pragay, D.A. et al. (1974) Pancreatitis and lipase. A re-evaluation with a five minute turbidimetric lipase determination. JAMA., 229:47.
19. Mottaleb, A., Kapp, F., Noguera, E.C.A., Kellock, T.D., Wiggins, H.S. and Walla, S.L. (1973) The lundh test in the diagnosis of pancreatic disease. A review of five years experience. Gut, 14:835.
20. Smith, E.H., Bartrum, R.J. Jr., Chang, V.C. et al. (1975) Percutaneous aspiration biopsy of the pancrease under ultrasonic guidance. N. Engl. J. Med., 292:825.
21. Stein, N.G. and Lepanto, P.B. Conventional Radiography, in Gastroenterology vol. 3, Edited by Bocus, H.L. Philadelphia, Saunders, 1976, p. 978.
22. Templeton, A.W., Stuber, J.L., Bishop,K. (1971) Abdominal and retroperitoneal sonography. Am. J. Roentgenol., 113:741.
23. Walls, W.J., Gonzalez, G., Martin, N.L. and Templeton, A.W. (1975) B-Scan ultrasound evaluation of the pancreas. Radiology, 114:127.
24. Waller, S.L. (1975) The Lundh test in the diagnosis of pancreatic disease. A comment from the moderator. Gut, 16:657.
25. Warshaw, W.L. and Fuller, A.F. Jr. (1969) Specificity of increased renal clearance of amylase in man. Scand. J. Gastroenterol., 4:623.