

Revisiting The Problem Of Pancreatic Exocrine Insufficiency In Surgical Patients

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Abstract

Detailed knowledge of the surgical procedure and its potential early and late complications is a prerequisite for the recognition and treatment of problems occurring after pancreatic, gastric and other gastrointestinal surgery. Exocrine enzyme insufficiency is a common problem in surgical patients, under-estimated and under-treated. Simple investigations or clinical suspicion are required to address this problem to have a better quality of life.

INTRODUCTION

Exocrine pancreatic insufficiency is a common clinical entity in many surgical patients as in acute pancreatitis, chronic pancreatitis, pancreatic neoplasm, pancreatic resections, bowel resections, Whipple's operation and total or partial gastrectomy. It may be secondary to decreased enzyme production, activation or deactivation¹. Exocrine pancreatic insufficiency and resultant maldigestion occurs in up to 80% of patients following gastric, duodenal and pancreatic surgery. It is important to understand this clinical entity and the group of patients requiring treatment with enzyme replacement therapy.

DIAGNOSING PANCREATIC ENZYME INSUFFICIENCY

With the background of chronic or acute pancreatitis, gastrectomy or pancreatic surgery, pancreatic exocrine insufficiency is clinically evident with history of malnutrition, maldigestion, anorexia, and failure to gain weight.

The diagnosis of pancreatic insufficiency can be made by a variety of direct and indirect pancreatic function tests as cholecystokinin (CCK) test, secretin stimulation test or Lundh test, which are clinically available².

Both CCK and secretin test are done giving analogues to the patient and collecting enzymes through the duodenal tube^{3,4}. Endoscopic pancreatic exocrine function tests can be safely done at all hospitals where endoscopic facilities are available by aspirating the secretions at 0, 15, 30, 45 and 60 minutes⁵. Among the indirect tests, fecal elastase is highly sensitive

and specific for the diagnosis of pancreatic exocrine insufficiency⁶. Other indirect tests include 24- and 72-hour fecal test, serum and urine pancreolauryl test, and, more recently, 13-C mixed triglyceride breath test, which are reliable in diagnosing the exocrine insufficiency^{7,8}. Fecal fat test is done by using the standard Van de Kamar test or by infrared analysis.

PATHOPHYSIOLOGY INVOLVED IN PANCREATIC EXOCRINE INSUFFICIENCY

The pathophysiology involved in pancreatic exocrine insufficiency is nothing but alteration of normal physiology or the diseased pancreas per se secreting less enzymes. Anatomical changes after GI and pancreatic surgery also leads to physiological changes that cause maldigestion. Resection of stomach leads to disturbances in fundus relaxation which in turn hampers anterofundic and duodenofundic reflexes and which does not allow nutrients to move in a progressive manner and mix with pancreatic secretions. Lack of fundus relaxation also leads to absence of neurally stimulated secretions which in turn aggravates the existing problem. Another aspect is that large and hard-to-digest nutrient particles reach the jejunum in addition to decreased secretion. In case of duodenal resection there is reduction of CCK-mediated pancreatic secretion. There is also asynchrony between the gastric emptying and the biliopancreatic secretion due to new tracts of various reconstructions. In gastrectomy patients, decreased enzyme stimulation and decreased enzyme activity is also attributed to bacterial overgrowth.

It is a known fact that there is low CCK release after Whipple's procedure when compared to duodenum-preserving pancreatic resections⁹.

MAGNITUDE OF THE PROBLEM AND RESPONSE TO THE TREATMENT

Painful chronic pancreatitis is a frustrating problem both for patients and clinicians, and affects between 0.4 and 5% of the adult population. The condition typically has recurrent bouts of severe abdominal pain, particularly after eating, and the pain is often accompanied by nausea and vomiting. Because of exocrine insufficiency, severe weight loss and malnutrition often coexist.

In a study on 155 cases of chronic pancreatitis it was seen that many patients (32%) were malnourished before surgery and the problem continues after surgery¹⁰.

Another study on quality of life in 66 patients of chronic pancreatitis revealed poor nutritional status negatively affecting the quality; 34 % had moderate to severe weight loss and 46% had severe fatigue¹¹.

In acute pancreatitis, maintenance of nutrition reduces morbidity and multi-organ failure¹², especially in the recovery phase where exocrine insufficiency needs attention^{13,14}.

Evaluation of the maldigestion is of high clinical significance in order to assess the pancreatic enzyme replacement therapy. All patients undergoing gastrointestinal surgery of the above mentioned nature with clinically evident steatorrhea, weight loss and maldigestion-related symptoms like anorexia and failure to gain weight should be considered for enzyme replacement therapy. The studies evaluating the usefulness of enzyme replacement in nutritional status of enzyme insufficient patients are limited¹⁵, though pancreatic insufficiency following all kinds of pancreatic surgery is a well established fact^{16,17}.

Two randomized controlled studies regarding enzyme replacement therapy documented statistically significant decrease in fat excretion and stool volume in patients with replacement when compared to the group receiving placebo, but there was no significant association between the replacement and improvement in abdominal and global symptoms^{18,19}. Another study on enzyme replacement for gastrectomized patients revealed a significant decrease in steatorrhea and stool consistency but no improvement in bloating and dumping symptoms²⁰.

On rarer instances, physicians may also come across patients with aches and pain and difficulty to walk who show a deficiency of vitamin D3 in association with pancreatic exocrine insufficiency that may improve with oral pancreatic enzyme therapy²¹. By and large, a major problem of deficient enzymes is seen in surgical patients with acute or chronic pancreatitis and post major resection surgeries. Conservative resection may be a newer remedy applicable to a small group of selective patients^{22,23} but in majority the problem needs to be timely recognized and adequately treated.

CONCLUSION

Pancreatic exocrine insufficiency is an under-addressed problem and should be suspected in a particular group of surgical patients, so that it may be adequately treated for better quality of life.

References

1. Doninguez-Munoz JE: Pancreatic enzyme therapy for pancreatic exocrine insufficiency. *Curr Gastroenterol Rep*; 2007, 9: 116-122.
2. Chowdhury RS, Forsmark CE: Pancreatic function testing. *Aliment Pharmacol Ther*; 2003; 17: 733-750.
3. Keller J, Aghdassi AA, Lerch MM, Mayerle JV, Layer P: Tests for pancreatic exocrine function – clinical significance in pancreatic and non-pancreatic disorders. *Best Pract Res Clin Gastroenterol*; 2009; 23: 425-439.
4. Ribet A, Toumut R, Duffaut M, Vaysse N: Use of caerulein with submaximal doses of secretin as a test of pancreatic function in man. *Gut*; 1976; 17: 431-434.
5. Okeefe SJ, Stevens S, Lee K, Zhou W, Zfass A: Physiological evaluation of the severity of pancreatic exocrine dysfunction during endoscopy. *Pancreas*; 2007; 35: 30-36.
6. Naruse S, Ishiguro H, Ko SB, Yoshikawa T, Yamamoto T, et al.: Fecal pancreatic elastase, a reproducible marker for severe pancreatic insufficiency. *J Gastroenterol*; 2006; 41: 901-905.
7. Elphick DA, Kapur K: Comparing the urinary pancreolauryl ratio and fecal elastase 1 as indicator of pancreatic insufficiency in clinical practice. *Pancreatol*; 2005; 5: 196-200.
8. Braden B, Lembecke B, Kuker W, Caspary WF: 13C-breath tests: current state of the art and future direction. *Dig Liver Dis*; 2007; 39: 795-805.
9. Ito K: Duodenum preservation in pancreatic head resection to maintain pancreatic exocrine function (determined by pancreatic function diagnostic test and cholecystokinin secretion). *J Hepatobiliary Pancreat Surg*; 2005; 12: 123-128.
10. Riediger H, Adam U, Fischer E, Kee KT, Pfeffer F, Hopt UT, et al.: Long-term outcome after resection for chronic pancreatitis in 224 patients. *J Gastrointest Surg*; 2007; 11: 949-960.
11. Fitzsimmons D, Kahl S, Butturini G, Van Wyk M, Bornman P, Bassi C, et al. Symptoms and quality of life in chronic pancreatitis assessed by structured interview and EORTC QLS PAN 26. *Am J of Gastroenterol*; 2005; 100: 918-26.
12. Marik PE: What is the best way to feed patients with pancreatitis? *Curr Opin Crit Care*; 2009; 15: 131-138.

13. Symersky T, Von Hoorn B, Masclee AA: The outcome of long-term follow-up of pancreatic function after recovery from acute pancreatitis. *JOP*; 2006; 7: 447-453.
14. Boreham B, Ammori BJ: A prospective evaluation of pancreatic exocrine function in patients with acute pancreatitis: correlation with extent of necrosis and pancreatic endocrine insufficiency. *Pancreatology*; 2003; 3: 303-308.
15. Lankish PG: Appropriate pancreatic function tests and indication for pancreatic enzyme therapy following surgical procedures on pancreas. *Pancreatology*; 2001; 1 (suppl 1): 14-26.
16. Falconi M, Mantovani W, Crippa S, Mascetta G, Salira R, Pederzoli P: Pancreatic insufficiency after pancreatic surgery. *Best Pract Clin Gastroenterol*; 2004; 18: 949-955.
17. Neoptolemos JP, Ghaneh P, Andren-Sandberg A, Bramhall S, Patankar R, et al.: Treatment of pancreatic insufficiency after pancreatic resection. Result of a randomized, double-blind, placebo-controlled, crossover study of high vs standard dose pancreatin. *Int J Pancreatol*; 1999; 25: 171-180.
18. Van Hoozen CM, Peeke PG, Taubeneck M, Frey CF, Halsted CH: Efficiency of enzyme supplementation after surgery for chronic pancreatitis. *Pancreas* , 1997 , 14: 174-180.
19. Armbrrecht U, Lunde L, Stockbrugger RW: The benefit of pancreatic enzyme substitution after total gastrectomy. *Aliment Pharmacol Ther*; 1988; 2: 493- 500.
20. Brägelmann R, Armbrrecht U, Rosemeyer D, Schneider B, Zilly W, Stockbrügger RW: The effect of pancreatic enzyme supplementation in patients with steatorrhea after total gastrectomy. *Eur J Gastroenterol Hepatol*; 1999; 11: 231-237.
21. Christensen AT, Østergård T, Andersen V: Severe impaired deambulation in a patient with vitamin D and mineral deficiency due to exocrine pancreatic insufficiency. *JOP*. 2011; 12(5): 482-4.
22. Dumitrascu T, Stanciulea O, Herlea V, Tomulescu V, Ionescu M: Central pancreatectomy for pancreatoblastoma in a 16-year-old girl. *J Pediatr Surg*; 2011; 46(8): e17-21.
23. Turrini O, Schmidt CM, Pitt HA, Guiramand J, Aguilar-Saavedra JR, Aboudi S, et al.: Side-branch intraductal papillary mucinous neoplasms of the pancreatic head/uncinate: resection or enucleation? *HPB (Oxford)*; 2011; 13: 126-131.

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