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## Drainage tube endoscopy: a contribution to the management of severe acute pancreatitis?

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**Abstract** Peritoneal lavage is one of the interventional approaches that have gained some attention in the early, toxæmic phase of acute pancreatitis. Additionally some kind of drainage is necessary for suppurative collections that characterize the late phase of the disease. In both the above situations tube plugging is a common problem and it is usually associated with a relapse of the patient's septic state and newly formed collection(s) on abdominal CT. Two cases are presented, in early and in late phases respectively, in which drainage tube endoscopy (DTE) re-established tube patency

and ensured drainage. DTE may represent an alternative to surgery or to CT-guided paracentesis and evacuation of newly formed intra-abdominal collections secondary to tube obstruction.

**Key words** Severe Acute Pancreatitis (SAP) · Peritoneal lavage · Bursa lavage · Drainage tube endoscopy · Pancreatitis-complications

### Introduction

There is an increasing trend towards non-operative management of severe acute pancreatitis in an effort to delay or even avoid pancreatic surgery unless there are certain indications for this. There seems to be a role for interventional therapeutic approaches in both the early toxæmic and late necrotic phase. Peritoneal lavage, is one intervention that has attracted some attention for the early phase of the disease. However, its use is often limited due to progressive tube obstruction and lavage fluid retention in the abdominal cavity. In one study, peritoneal lavage was stopped in 4 of 12 patients because of tube plugging [1]. Additionally, some kind of drainage is necessary for suppurative collections, which usually characterize the late phase of the disease. The relapse of symptoms that patients occasionally develop postoperatively is frequently due to tube plugging [2]. This deterioration is commonly associated with the detection of a new fluid collection on abdominal computed

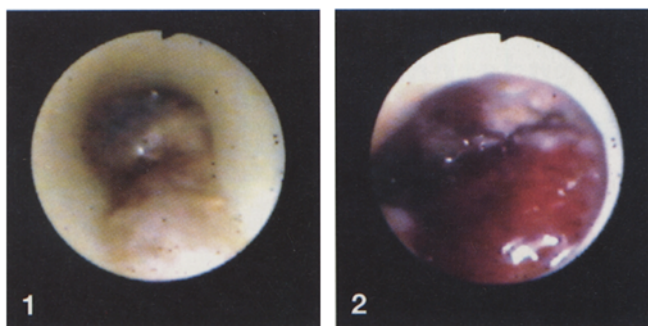
tomography (CT) and leads to reoperation or CT-guided percutaneous drainage [3, 4].

Two cases are presented, in which drainage tube endoscopy (DTE) was used for tube plugging, representing an alternative approach to those already described. The procedure was performed by the use of a fiberoptic bronchoscope with an outer diameter of 5.9 mm and with a channel inner diameter of 2.8 mm [Olympus Optical (Europa)].

### Case reports

#### Case 1

A 37-year-old male suffering from an attack of severe acute alcoholic pancreatitis with seven Ranson's signs [5] was admitted to the intensive care unit on the second day of the attack because of rapidly deteriorating hypoxemia [partial pressure of oxygen in arterial blood (PaO<sub>2</sub>) 56 mmHg, fractional inspired oxygen (FiO<sub>2</sub> 1)]. Intubation and mechanical ventilation were instituted and ul-



**Fig. 1** Endoscopic appearance of the plug located at the distal end of the tube

**Fig. 2** Laparoscopic view of pus and granulated tissue in the area adjacent to the unplugged tube

trasonography showed evidence of inflammation of the pancreas but no calculi in the gallbladder or in the common bile duct. Dynamic CT was obtained, which was consistent with an intact microcirculation in the gland. Forty-eight hours later the patient was febrile (38–39°C) and hypoxemia had deteriorated further: PaO<sub>2</sub> 52 mmHg, FiO<sub>2</sub>, and positive end-expiratory pressure 10 cmH<sub>2</sub>O. The pulmonary edema on chest X-rays, combined with the low filling pressures from right heart catheterization, were consistent with severe adult respiratory distress syndrome (ARDS).

The patient was operated on and large bore elastic tubes (made of latex, with an inner diameter of 8 mm and an outer diameter of 10 mm) were placed in the lesser sac for lavage combined with minimal pancreatic resection. Cholecystectomy was also performed because bile sludge was detected by palpation in the gallbladder. Postoperatively, lesser sac lavage was started with standard peritoneal dialysis fluids at a rate of 35 kg/day. The patient showed rapid improvement of his hypoxemia, with almost complete resolution of the ARDS, but his fever worsened on the 3rd postoperative day with mental confusion and failure of respiratory weaning while he was on antibiotic treatment with vancomycin, imipenem, and netilmicin. Retention of increasing amounts of lavage fluid in the abdominal cavity had been noted since the 2nd postoperative day. Without any further diagnostic work-up, we decided to deal with this apparent tube obstruction by performing DTE. The distal end of the draining tube was found to be almost completely obstructed (Fig. 1). Thorough stepwise mechanical cleansing of the tube was successfully performed until there was an adequate view of the interior of the abdomen showing surrounding granulation tissue and pus (Fig. 2). After the endoscope had been disinfected it was reinserted through each tube into the peritoneal cavity and gentle aspiration revealed 30 ml of pus. The same afternoon, after the procedure, there was a dramatic fall in the patient's temperature, while the tubes drained 150–250 ml of suppurative fluid daily for the next 3 days. *Proteus mirabilis*, recovered from the culture of the aspirated pus, was sensitive to ciprofloxacin but resistant to both imipenem and netilmicin. The patient was treated accordingly and a further improvement in oxygenation, defervescence, and weaning from the mechanical ventilator followed.

## Case 2

A 67-year-old male suffering from severe biliary pancreatitis with 6 Ranson's criteria was admitted to the intensive care unit because of multiple organ dysfunction syndrome (MODS) with

four dysfunctioning organs (ARDS, hemodynamic decompensation, altered level of consciousness, renal dysfunction). He underwent late endoscopic bile duct decompression (82 h after admission) combined with peritoneal lavage. He successfully overcame the acute phase of MODS but subsequently entered into a protracted febrile state and CT showed an extensive collection of fluid extending from the tail of the pancreas to the left paracolic region. The fluid was drained surgically, large bore elastic drainage tubes (made of latex, with an inner diameter of 8 mm and an outer diameter of 10 mm) were left in place and the fever subsided postoperatively. The patient was stable for the next 2 days, but then the fever relapsed with a deterioration in the patient's general condition. Repeated blood cultures were negative and cultures of the drainage fluid revealed multiple bacteria. Reoperation was considered and, as a last resort, a DTE was performed. The tubes were found to be obstructed and their patency was laboriously ensured. After disinfection, the endoscope was reinserted into the peritoneal cavity through each tube and suppurative fluid was aspirated and cultured. The tubes continued to drain 200–250 ml/day of this fluid for the next 4 days and cultures revealed *Acinetobacter anitratus* sensitive to imipenem. Following appropriate antibiotic therapy, the patient had an uneventful recovery.

## Discussion

No single operative or conservative therapeutic treatment cures severe acute pancreatitis. However, there is often a need for tube placement for either lavage (peritoneal or bursal) or for drainage of suppurative collections. Frequently in severe acute pancreatitis the cavities contain large amounts of necrotic, semisolid material which cannot be adequately drained through small-diameter percutaneous tubes. Even the larger caliber tubes, placed surgically, often plug and stop lavage or drainage.

Tube plugging is usually associated with a relapse of the patients' septic state and newly formed collection(s) seen on abdominal CT. As an alternative to surgery for drainage, CT-guided paracentesis and evacuation has been advocated [6]. Although this procedure offers the advantage of sampling and cultural isolation of pathogens originating from the fluid [7], drainage from the small caliber tubes is limited for reasons similar to those for surgically placed large caliber tubes [8–10]. It seems, therefore, that ensuring patency of the tubes by DTE offers a good alternative to reoperation. Thus, the tubes continue to fulfill the original reason of their placement, i.e., either peritoneal or lesser sac lavage or the drainage of suppurative material. Additionally, cultures from DTE may reveal the pathogen(s) responsible for the septic state, particularly when multiple blood cultures are negative or cultures of the tube-aspirated material give unreliable results.

The patients under discussion required the surgical placement of draining tubes for different reasons, i.e., lesser sac lavage and drainage of collected fluid, respectively. However, both patients showed clinical

deterioration following tube plugging. Simple rinsing of the obstructed tubes was not effective; the irrigation fluid was retained in the abdominal cavity, probably due to a ball-valve mechanism of the plug. Reestablishment of patency combined with aspiration both ameliorated the patients' condition and revealed the offending bacterium. Both patients demonstrated further improvement after antibiotic therapy was adapted to the cultures, and had an uneventful recovery.

In case 1, after tube obstruction had been recognized, probable subsequent therapeutic alternatives would be to remove the tubes, perform additional imaging, and take the patient back to the operating room for surgical exploration and reinsertion of the tubes. In case 2, the

problem was different, i.e., the evaluation of unreliable culture results revealing multiple bacteria from tube drainage. An alternative solution would be to proceed with CT-guided needle aspiration. DTE may represent a safer and more effective procedure than both reoperation and CT-guided aspiration, considering, in addition, that it is performed as a bedside procedure. Although no complication occurred, it is important to emphasize the possible risk of intra-abdominal hemorrhage or possible injuries to the bile duct or the intestine. For this reason, endoscopic manipulations and suctioning must be performed gently and cautiously. Undoubtedly, DTE needs further evaluation as a potential adjunct to the diagnostic and therapeutic approach to patients with severe acute pancreatitis.

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