

中文題目：綠色腹膜透析排出液：診斷腹膜透析患者腸穿孔之線索

英文題目：Green dialysate effluent: a diagnostic clue for bowel perforation in a peritoneal dialysis patient.

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Introduction:

Bowel perforation in peritoneal dialysis (PD) patients is a severe complication with a high mortality but could be difficult in diagnosis due to ambiguous symptoms. Pneumoperitoneum, a pathognomonic radiographic sign of bowel perforation in general population, is found in up to 35% of PD patients without hollow organ perforation.¹ We reported a PD patient with abdominal free air, refractory peritonitis and septic shock. A diagnostic test was performed and green dialysate effluent was found, which helped us make the final diagnosis of bowel perforation.

Case presentation:

A 67-year-old man with end-stage renal disease on continuous ambulatory peritoneal dialysis (CAPD) was referred to the Taipei Veterans General Hospital from a local hospital for refractory peritonitis and persistent septic shock. Initially, he presented to the local hospital with a history of several weeks of abdominal fullness, poor appetite and a 1-week history of progressive disturbed consciousness. Blood tests revealed leukocytosis (18,870/ μ L), elevated C-reactive protein level (36 mg/dL), hyponatremia (132 mEq/L) and hypokalemia (2.21 mEq/L) were noted. Leukocyte count in the dialysate effluent was 1,160 cells/ μ L (normal range <100 cells/ μ L) with 95% neutrophils. A culture of the peritoneal dialysis effluent yielded Viridians Streptococci. Computed tomography of the abdomen showed peritonitis with small amount of abdominal free gas (Figure 1), which was presumably attributed to insufficient air venting during exchanging dialysate bags. PD-associated peritonitis was diagnosed and he was treated with clindamycin, imipenem, tigecycline and fluconazole. However, abdominal pain with drowsy consciousness persisted and therefore he was referred to our hospital for further treatment.

After referral, dialysate effluent turned brown one day after admission to our hospital. Hollow organ perforation was highly suspected, the methylene blue test for detection of gastrointestinal perforation was applied after consultation of a general surgeon. Dark greenish peritoneal dialysate was drained after instillation with 3 mL of methylene blue (10 mg/mL) via the nasogastric tube (Figure 1). Exploratory laparotomy confirmed a large perforation at the ischemic small bowel about 100 cm from Treitz ligament and much bile-contained dirty ascites was removed. Enterolysis with loop ileostomy were performed. His infection was controlled gradually after operation and he was discharged uneventfully three months later.

Discussion:

Perforated viscus is a life-threatening condition and should be taken into consideration for patients with medically-refractory peritonitis. PD-related peritonitis, namely contamination with pathogenic skin bacteria during dialysate exchange, exit-site and tunnel infection, is the main cause of peritonitis in PD patients. Nonetheless, secondary peritonitis such as perforated peritonitis in PD patients is an infrequent but devastating complication with a high mortality rate up to 46.3%.² The diagnosis of perforated peritonitis relies on clinical symptoms, physical examination and laboratory studies, and pneumoperitoneum on computed tomography is considered pathognomonic of hollow organ perforation in the general population. However, pneumoperitoneum has been reported in 20%–35% of patients undertaking CAPD because of the inappropriate dialysate exchanging technique.¹ The International Society for Peritoneal Dialysis guideline points out that identification of multiple organisms (particularly both gram-positive and gram-negative) is highly suggestive of an enteric cause (e.g. strangulated bowel, ischemic colitis, appendicitis) for peritonitis; however, this only occurs in less than 20% of patients with enteric peritonitis.³

Methylene blue is a dye as treatment of methemoglobinemia, staining of tissues, and test for the anastomoses dehiscence and the presence of fistulas.⁴ The integrity of the upper gastrointestinal tract can be evaluated by oral application. In the presence of gastrointestinal tract leakage, methylene blue can be observed by drainage or under laparoscopy during operation.

In this case, medically-refractory peritonitis and brownish dialysate effluent accompanied with abdominal pain and muscle guarding prompted the possibility of bowel perforation. We gave methylene blue via the nasogastric route to test the gastrointestinal tract integrity and conspicuous greenish peritoneal dialysate effluent soon after administration. Small bowel perforation was confirmed after exploratory laparotomy. Administration of methylene blue to detect gastrointestinal tract leakage is a simple and useful diagnostic test for PD patients with suspicious bowel perforated peritonitis.

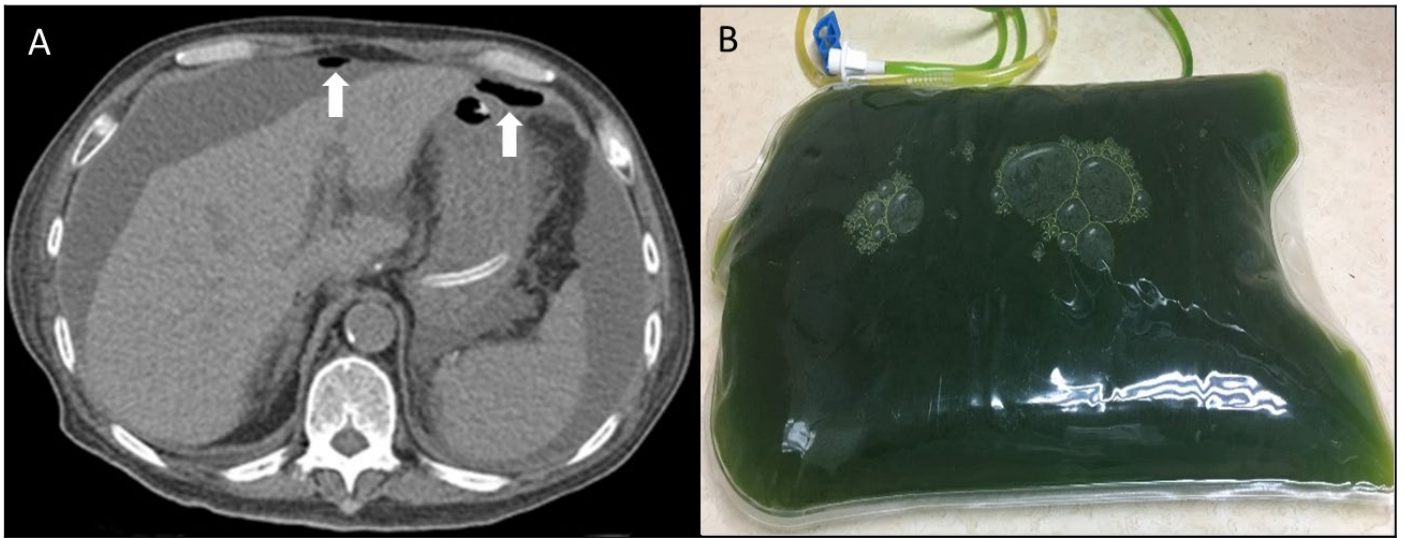
Conclusion:

This case showed that green dialysate effluent after administration of methylene blue could be a simple and safe approach to diagnose bowel perforated peritonitis in PD patients with uncertain clinical and radiographic manifestations.

References:

1. Williams NM, Watkin DF Spontaneous pneumoperitoneum and other nonsurgical causes of intraperitoneal free gas. *Postgrad Med J* 1997;73: 531-7.
2. Kern EO, Newman LN, Cacho CP, Schulak JA, Weiss MF Abdominal catastrophe revisited: the risk and outcome of enteric peritoneal contamination. *Perit Dial Int* 2002;22: 323-34.
3. Barraclough K, Hawley CM, McDonald SP, et al Polymicrobial peritonitis in peritoneal dialysis patients in Australia: predictors, treatment, and outcomes. *Am J Kidney Dis* 2010;55: 121-31.
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Figure 1.



Legend to Figure 1:

Panel A: A representative abdominal computed tomography image shows some free air (white arrows) in the abdominal cavity.

Panel B: Dark greenish peritoneal dialysate after nasogastric administration of 3 mL of methylene blue (10 mg/mL).