SUCCESSFUL CONSERVATIVE TREATMENT OF PNEUMATOSIS INTESTINALIS AND PORTOMESENTERIC VENOUS GAS IN A PATIENT WITH SEPTIC SHOCK

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Pneumatosis intestinalis (PI) and portomesenteric venous gas (PMVG) are alarming radiological findings that signify bowel ischemia. The management of PI and PMVG remain a challenging task because clinicians must balance the potential morbidity associated with unnecessary surgery with inevitable mortality if the necrotic bowel is not resected. The combination of PI, portal venous gas, and acidosis typically indicates bowel ischemia and, inevitably, necrosis. We report a patient with PI and PMVG caused by septic shock who completely recovered after conservative treatment.

Key Words: bowel ischemia, computed tomography, pneumatosis intestinalis, portal venous gas, portomesenteric venous gas


CASE PRESENTATION

A 78-year-old woman who presented with intermittent fever for 3 days was referred to the emergency department of our hospital. The patient had a history of type 2 diabetes mellitus, congestive heart failure, and prior cerebral infarct. He had undergone right nephrectomy due to renal cell carcinoma. Other symptoms of the patient included shortness of breath, drowsy consciousness, abdominal fullness, and epigastric pain. Physical examination revealed fever (38.5°C), diffuse abdominal tenderness, and icteric sclera.

Laboratory studies revealed leukocytosis (white blood cells, 19,200 cells/mm³), slight hypoglycemia (58 mg/dL), elevated blood urea nitrogen (43 mg/dL), creatinine (3.3 mg/dL) and γ-glutamyl transpeptidase (201 U/L) levels, an electrolyte imbalance (sodium/potassium, 132/3.2 mmol/L), mild bleeding tendency...
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(prothrombin time/activated partial thromboplastin time, 14.4/44.1 seconds) and hyperbilirubinemia (total/direct, 4.95/4.31 mg/dL). She was mildly aci-
demic upon examination, with an arterial pH of 7.33
and a partial CO₂ of 26 mmHg. Progressive shortness
of breath and unstable hemodynamics with a decrease
in blood pressure to 70/38 mmHg developed the same
day, and the patient was transferred to our intensive
care unit.

Endotracheal intubation was done due to respira-
tory distress because the chest X-ray film revealed mild
pulmonary edema. An emergency abdominal com-
puted tomography (CT) scan was arranged following
the development of progressive abdominal pain, ab-
dominal distention and peritoneal signs. The CT scan
revealed PI with poor mucosal enhancement of the
ileum, in addition to PMVG (Figures A and B). No
occlusion of the main trunk or ileal branches of the
superior mesenteric artery was noted. There was also
mild dilatation of the common bile duct and intrahe-
patic ducts. Because we suspected bowel ischemia with
transmural necrosis, an emergency operation was rec-
ommended for the patient. However, because of her
age and the high mortality rate associated with surgery
for this condition, the patient’s family chose conser-
vative treatment instead of surgery. The patient was
given supportive therapy, which included fasting
with fluid replacement and total parenteral nutrition.
Empiric antibiotics with metronidazole (500 mg every
8 hours) and ceftriaxone (200 mg every day) were
initially prescribed for her intra-abdominal infection.
Ceftriaxone was then changed to ceftaxime (200mg
every 12 hours) due to persistent fever on day 3 of
admission. Escherichia coli, Morganella morganii, and
Pseudomonas aeruginosa were isolated from the blood
culture 6 days later.

The general condition of the patient improved after
conservative treatment and the jaundice subsided. A
follow-up CT scan was done 4 days after the conserva-
tive treatment and depicted no obvious PI and PMVG
together with normal enhancement of the intestine
wall (Figure C). Endoscopic retrograde cholangiopan-
creatography was scheduled after her hemodynamics
had stabilized and revealed stenosis of the distal
common bile duct. Subsequent sphincterectomy with
biliary stent placement was done. The patient was
discharged in good condition after 3 weeks.

**DISCUSSION**

Bowel ischemia or infarction caused by insufficient
blood flow to the intestine has various causes,
including thromboembolism, non-occlusive causes,
bowel obstruction, neoplasms, vasculitis, abdominal
inflammatory conditions, trauma, drugs, radiation,
and corrosive injury. The presence of PMVG and PI is
predictive of bowel infarction. Mortality rates have
been reported to exceed 75% in patients in whom PI
and PMVG are both seen on plain films [5,6]. PI and

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**Figure.** A 78-year-old woman with septic shock and peritoneal signs. (A) Axial computed tomography (CT) scan showed pneumatosis
intestinalis (black arrow) and air collection in the mesenteric vein (white arrow). Dilatation of the ileum with poor enhancement of
the mucosal layer was also noted. (B) A coronal reformatted CT scan revealed PI (black arrow), portomesenteric venous air (white arrow),
and portal air in the liver (arrowhead). (C) A follow-up CT scan was done 4 days after the conservative treatment. The coronal reformatted
CT showed no air collection in the bowel wall or the portomesenteric vein. Normal enhancement of the small intestine, without obvious
dilatation was noted.
PMVG can be detected early by a CT scan and the concurrent findings are predictive of bowel ischemia [2,7]. About 91% of patients with both PMVG and PI show transmural bowel infarction [7]. Fortunately, the bowel ischemia associated with PI and PMVG was reversible in this patient and she recovered uneventfully.

Non-occlusive bowel ischemia is a condition in which the mesenteric arteries and veins are patent, but the blood flow through is too slow to deliver sufficient oxygenated blood to the intestine. It is generally a result of vasospasm and vasoconstriction, which typically occur in critically ill patients who are in low-flow states (e.g. septic shock, cardiac shock, burns, or hypovolemic shock) [8]. The outcomes of surgical management of mesenteric ischemic bowel disease are poor [9]. The goal of therapy for non-occlusive bowel ischemia is to reduce the spasm and improve the perfusion of the mesenteric artery using vasodilators in the early stage. Surgery is reserved for excision of irreversibly necrotized intestine [10].

The management of PI and PMVG remains a challenging task because clinicians must balance the potential morbidity of unnecessary surgery with inevitable mortality if the necrotic bowel is not resected. Knechtle et al reported that asymptomatic patients with PI and PMVG without metabolic acidosis could be safely observed, while those with clinical evidence of bowel obstruction or ischemia required emergency surgery [4]. Conservative treatment of patients with PI or PMVG has been reported by several authors, including PI as a result of cytotoxic or immunosuppressive treatment [11,12] and as a postoperative condition [13]. No clinical signs of secondary complications such as peritonitis, ischemia, or perforation were seen in the patients in the above reports. To our knowledge, ours is the first case of PI and PMVG associated with peritoneal signs, acidemia and sepsis to be successfully treated with conservative therapy.

In conclusion, patients with PI and PMVG caused by non-occlusive bowel ischemia, even those associated with mild acidemia and peritoneal sign, could be successfully treated with conservative therapy, although the opportunity for this might be very rare. For patients with poor conditions and who are considered to be high risk for surgery, rapid improvement after conservative treatment may indicate a good prognosis for recovery. Careful monitoring and selection of patients may help to avoid unnecessary exploratory surgery.

REFERENCES

成功以保守治療醫治腸氣囊腫病合併門脈腸系靜脈積氣及酸血症的病例報告

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腸氣囊腫病（pneumatosis intestinalis）和門脈腸系靜脈積氣（ortomesenteric venous gas）在影像診斷學上是缺血性腸道疾病（Ischemic Bowel Disease）非常重要的表現，當病人的影像出現腸氣囊腫病或是門脈腸系靜脈積氣時，臨床醫師要如何作最適當的處置，依然是一項富挑戰性任務，因為如果壞死的腸組織沒有被切除，無可避免的會造成病人死亡，但是多餘的手術亦會有潛在的併發症。由以往的文獻得知，當病人同時出現腸氣囊腫病、門脈腸系靜脈積氣和酸血症的表現時，腸組織的壞死幾乎是不可避免的。我們報告一例罕見的病例，病人因為敗血症合併出現腸氣囊腫病、門脈腸系靜脈積氣及酸血症的表現，但在保守治療之後，病人完全恢復且健康的出院。

關鍵詞：腸氣囊腫病，電腦斷層，缺血性腸道疾病，門脈積氣，門脈腸系靜脈積氣
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