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CASE REPORT

Two case reports of gastroendoscopy-associated *Acinetobacter baumannii* bacteremia

Chang-Hua Chen, Shun-Sheng Wu, Chieh-Chen Huang

Chang-Hua Chen, Section of Infectious Diseases, Department of Internal Medicine, Changhua Christian Hospital, Changhua 500, Taiwan
Shun-Sheng Wu, Section of Gastroenterology, Department of Internal Medicine, Changhua Christian Hospital, Changhua 500, Taiwan
Chieh-Chen Huang, Department of Life Science, College of Life Science, National Chung Hsing University, Taichung 402, Taiwan
Author contributions: Chen CH, Wu SS and Huang CC contributed equally to clinical management; Chen CH and Huang CC designed research and performed research; Chen CH wrote the paper; Huang CC revised the paper.
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Correspondence to: Chieh-Chen Huang, PhD, Professor, Department of Life Science, College of Life Science, National Chung Hsing University, 250 Kuo-Kuang Road, Taichung 402, Taiwan. cchuang@dragon.nchu.edu.tw
Telephone: +886-4-22840416 Fax: +886-4-722874740
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Core tip: After a literature review, we suggest that correct gastroendoscopy technique and skill in drainage procedures, as well as antibiotic prophylaxis, are of paramount importance in minimizing the risk of gastroendoscopy-associated bacteremia. Gastroenterologists should give more attention to gastroendoscopy-related infections, and increased clinical alertness may be the best way to reduce the impact from these types of infections.

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Abstract

Two cases of gastroendoscopy-associated *Acinetobacter baumannii* (*A. baumannii*) bacteremia were discovered at the study hospital. The first case was a 66-year-old woman who underwent endoscopic retrograde cholangiopancreatography and endoscopic retrograde papillotomy, and then *A. baumannii* bacteremia occurred. The second case was a 70-year-old female who underwent endoscopic retrograde biliary drainage due to obstruction of intra-hepatic ducts, and bacteremia occurred due to polymicrobes (*Escherichia coli*, *viridans streptococcus*, and *A. baumannii*). After a literature review, we suggest that correct gastroendoscopy technique and skill in drainage procedures, as well as antibiotic prophylaxis, are of paramount importance in minimizing the risk of gastroendoscopy-associated bacteremia.

INTRODUCTION

Gastroendoscopy is a commonly used procedure for diagnosis and therapy, such as in endoscopic retrograde cholangiopancreatography (ERCP). Infection is one of the most common morbidity complications of gastroendoscopy. Septic complications of ERCP include ascending cholangitis, liver abscess, acute cholecystitis, infected pancreatic pseudocyst, infection following perforation of a viscus, and, less commonly, endocarditis and endovasculitis[1]. Bacteria can enter the biliary tract by hematogenous or, more frequently, by a retrograde route, and the most common organisms transmitted by ERCP are *Escherichia coli, Klebsiella* species, and *Enterobacter* species[2]. Here we report two interesting cases of gastroendoscopy-associated *Acinetobacter baumannii* (*A. baumannii*)(GEaAb) bacteremia.

CASE REPORT

Case 1

The patient was a 66-year-old woman who visited a gastroenterologist for complaints of right upper quadrant pain and hunger pain. The initial impression was of a gall bladder stone. An ERCP was performed, and it showed a common bile duct of 16.1 mm in diameter and several filling defects in the gall bladder; therefore, an endoscopic retrograde papillotomy (EPT) was executed over the proximal portion of the bile duct, after which a gallstone was removed. The course of the procedure went smoothly. She again began to feel right quadrant pain and fever the next day, so she was admitted for further evaluation and management. At admission, vital sign measurements were: blood pressure, 100/90 mmHg; temperature, 38 ℃; pulse rate, 110 beats/min; and respiratory rate, 20 breaths/min. The patient appeared acutely ill. The abdomen was distended and ovoid. There was radiation pain and tenderness to her back, and abdominal fullness over the right quadrant area (positive Murphy's sign), but no rebounding pain. Admission laboratory results revealed the following: white blood cell count, 12700/mm^3; blood creatinine level, 0.8 mg/dL; serum amylase, 815 IU/L; serum bilirubin, 0.88 mg/dL; aspartate transaminase, 55 U/L; and alanine transaminase, 140 U/L. Abdominal echography revealed peri-pancreatic fluid accumulation. On the first day of admission, the patient was treated with antibiotics (cefazolin 1 g every 8 h plus gentamicin 60 mg every 12 h) and adequate fluid hydration, after initially remaining nil per os (NPO). A blood culture revealed *A. baumannii* on the 4th admission day, and the antibiotic treatment was switched to imipenem-cilastatin 500 mg every 6 h according to the antibiotics susceptibility test. Clinically, the source of *A. baumannii* was from the biliary tract, and it could be related to the previous invasive procedure. Because of persistent fever, an abdominal computed tomography was performed and showed a pancreatic abscess; consequently, an echo-guided aspiration was performed on the 5th admission day. The fever gradually subsided and follow-up laboratory data showed improvement. The total duration of parenteral imipenem-cilastatin usage was 21 d, after which antibiotic therapy was switched to oral levofloxacin 500 mg per os daily. The patient was discharged on the 44th admission day and was followed in the out-patient department (OPD). She has recovered quite well.

Case 2

This patient was a 70-year-old female with liver cirrhosis related to hepatitis C virus infection. At initial presentation, laboratory test results were as follows: serum bilirubin, 0.52 mg/dL; aspartate transaminase, 42 U/L; alfa-fetoprotein, < 20 ng/mL; and hepatitis C virus-antibody titer, positive. The abdominal computed tomography scan showed multiple nodular hypervascular tumor stains in both lobes of the liver, especially in the right lobe. Hepatocellular carcinoma was highly suspected. Transarterial chemo-embolization (TACE) of both sides of the liver was performed, and she was regularly followed in the OPD while she received TACE 6 times over the course of 20 mo. Her follow-up laboratory tests showed a serum bilirubin of 8.6 mg/dL, an aspartate transaminase of 72 U/L, and an alkaline phosphatase of 371 U/L. An abdominal echography exam revealed focal dilated intrahepatic ducts. Hence, an endoscopic retrograde biliary drainage (ERBD) procedure was performed accordingly, at which time a stent (11 Fr) was inserted into the intrahepatic ducts through the common bile duct. She began to feel right quadrant pain and fever three days later, and she was admitted under the impression of cholangitis. At admission, vital signs included a blood pressure of 100/90 mmHg, a temperature of 38 ℃, a pulse rate of 110 beats/min, and a respiratory rate of 20 breaths/min. Murphy's sign was positive. Admission laboratory results revealed the following: white blood cell, 5600/mm^3; serum total bilirubin, 27.65 mg/dL; serum direct bilirubin, 19.2 mg/dL; aspartate transaminase, 60 U/L; and alanine transaminase, 140 U/L. The abdominal echography showed left intra-hepatic duct dilatation. On the first day of admission, the patient was treated with antibiotics (cefazolin 1 g every 8 h plus gentamicin 60 mg every 12 h) and adequate fluid hydration after initially being NPO. Echo-guided percutaneous transhepatic cholangeal drainage was performed. Blood culture revealed polymicrobes (*Escherichia coli*, *viridans streptococcus*, and *A. baumannii*) on the 4th admission day, and treatment was changed to imipenem-cilastatin 500 mg every 6 h according to the antibiotics susceptibility test. The fever gradually subsided. Clinically, the source of *A. baumannii* was from the biliary tract, and it could be related to the previous invasive procedure. Follow-up laboratory data did not, however, seem much improved. This patient expired due to severe hepatic failure with multiple organ failure.

Evidence-based literature review and epidemiological study

After noting those two GEaAb cases in our institute, we conducted an evidence-based literature review (Table 1)[3-7]. Norfleet's study showed that 6% of patients who received upper gastrointestinal endoscopic examinations developed bacteremia, but only one of 447 patients acquired *Acinetobacter* bacteremia[4]. Maulaz's study described that the bacteremia incidence in cirrhotic patients who received variceal ligation was 2.5%, and only one *Acinetobacter lwoffii* infection was disclosed[5]. Only two case reports described post-endoscopic retrograde cholangiopancreatography-associated *Acinetobacter* infection in the United States National Library of Medicine National Institutes of Health[6,7]. Additionally, we performed a retrospective cross-sectional epidemiological study in our institute to identify GEaAb bacteremia cases and elucidate the possible sources of infection for a further five years from the year of identifying these two patients. During this period of five years, we disclosed 45 *A. baumannii* bacteremia cases. Most of them resulted from hospital-

Table 1 Evidence-based literature review for gastroendoscopy-associated *Acinetobacter* bacteremia

Ref.	Country	Evaluation	Risk factors	Microbiology	Treatment	Outcome
Norfleet *et al*[3], 1981	United States	447 patients have been evaluated, of which 6% had bacteremia after upper gastrointestinal endoscopy	Upper gastrointestinal endoscopy	One case with *Acinetobacter sp* infection	NM	NM
Maulaz *et al*[4], 2003	Brazil	The bacteremia incidence in cirrhotic patients submitted to variceal ligation was 2.5%, showing no difference from the control groups	Endoscopic variceal ligation or esophagogast roduodenoscopy only	One case with *Acinetobacter lwoffii* infection	NM	One case with *Acinetobacter lwoffii* infection is survived
Oh *et al*[5], 2007	South Korea	A total of 364 patients who underwent PTC were included in the study	Cholangitis and bacteremia were associated with percutaneous transhepatic biliary drainage and tract dilation, catheter migration and blockage with tract maturation, and bile duct injury with PTC	NM	NM	NM
Lai *et al*[6], 2008	Taiwan	Case report	Endoscopic procedure	Initial, polymicrobes (*Acinetobacter baumannii*, *Klebsiella pneumoniae* and *Enterococcus Faecalis*), then became *Acinetobacter* genomic species 13TU at day 14	Ceftazidime and ampicillin-sulbactam, then intravenous gentamicin and ciprofloxacin (parenteral antibiotics for 4 wk) then followed by oral ciprofloxacin and trimethoprim-sulfamethoxazole (for another 13 d) , antibiotics used for 61 d in total	Survived
de la Tabla Ducasse *et al*[7], 2008	Spain	Case report	Post-endoscopic retrograde cholangiopancreatography	*Acinetobacter ursingii* infection	Cefotaxime	Survived

NM: Not mentioned; PTC: Percutaneous transhepatic cholangioscopy.

acquired pulmonary infection. We focused on biliary tract infections and gastroendoscopy-associated *A. baumannii*, but neither a case of biliary tract infection nor a case of GEaAb were disclosed among hospital-acquired infection patients. So, we excluded those hospital-acquired *A. baumannii* patients, and the results were 19 patients with documented non-hospital-acquired *A. baumannii* bacteremia. We focused on these 19 patients (the demographics and clinical presentations are listed in Table 2). We also performed a pulse-field gel electrophoresis (PFGE) analysis according to Seifert's method[8], and the results are shown in Figure 1. Patients 1, 11 and 14 appeared to have had similar fingerprint patterns according to a dendrogram and PFGE (Figure 1). In the analysis of 5 biliary sepsis cases, risk factors included one patient with common bile duct stone, one with diabetes mellitus, one with cholangiocarcinoma, one with liver cirrhosis, and one with hepatocellular carcinoma. In addition, 3 patients had received invasive diagnostic or therapeutic procedures: one had an EPT, one underwent percutaneous transhepatic cholangeal drainage, and one had ERBD (Table 2). Two of 5 biliary sepsis cases developed *A. baumannii* bacteremia. All of those patients received prophylactic antibiotics before the invasive medical procedures.

DISCUSSION

This is the first serial study and case reports of GEaAb bacteremia in Taiwan. In our study, this infection was seen in one patient after an EPT, and in one patient who underwent ERBD. Both diagnostic and therapeutic gastroendoscopy can lead to bacteremia, and gastroendoscopy-associated infection rates up to 27% have been associated with therapeutic procedures[9-11].

Mechanisms of gastroendoscopy-associated infections

Concerning the mechanisms of gastroendoscopy-associated infections, bacteria can enter the biliary tract by a hematogenous or, more frequently, a retrograde route. Estimates of

Table 2 Demographics and clinical presentations of 19 non-hospital-acquired *Acinetobacter baumannii* bacteremia patients

No.	Age (yr)	Sex	Chief complaint (d)	Previous admission	Initial diagnosis of infection	Underlying disease	Fever/shock	Route of entry[1]	Treatment (d)	Outcome
P1	67	F	RUQ pain (1)	0	Pancreatic abscess	CBD stone	Y/N	Biliary tract[1]	Cefazoline+gentamicin (5), imipenem-cilastatin (12), levofloxacin (8)	S
P2	76	F	Conscious disturbance (3)	3	Liver abscess	DM	Y/N	Biliary tract	Cefmetazole (3), imipenem-cilastatin (7), levofloxacin (7)	S
P3	79	M	SOB (7)	3	Pneumonia	Esophageal cancer	Y/N	Respiratory tract	Co-trimoxazole (4)	S
P4	40	F	SOB (3)	2	Sepsis	Breast cancer	Y/N	Primary[2]	Cefazoline+gentamicin (5), levofloxacin (7)	S
P5	74	M	Deafness (4)	0	Sepsis, sudden deafness	Nil	Y/N	Primary	Cefazoline + gentamicin (1)	S
P6	24	F	Fever, right flank pain (1)	2	Acute pyelonephritis	Pelvic cancer	Y/N	Urinary tract	ampicillin-sulbactam (7), co-trimoxazole (3)	S
P7	76	F	Chest pain (1)	0	Sepsis	AMI	N/Y	Primary	Cefmetazole (4), imipenem-cilastatin (7)	S
P8	80	F	SOB (1)	1	Urinary tract infection	Right renal stone	Y/N	Urinary tract	Cefazoline (5), amikacin (7)	S
P9	82	M	Hematuria (1)	1	Urinary tract infection	Old CVA	Y/N	Urinary tract	Nil	S
P10	1	M	Fever (1)	0	Neonetal infection	Nil	Y/N	Primary	Ampicillin (5)	S
P11	33	F	SOB (3)	1	Sepsis	Cholangiocarcinoma	Y/N	Primary[3]	Cefmetazole (1), imipenem-cilastatin (7)	S
P12	64	M	Abdominal pain (3)	2	Cholangitis	Liver cirrhosis, uremia, AF	N/Y	Biliary tract	Cefazoline (5), gentamicin (14)	E
P13	73	F	Epigastric pain (1)	0	Urosepsis	DM	Y/N	Urinary tract	Imipenem-cilastatin (14)	S
P14	70	M	RUQ pain (1)	2	Cholangitis	HCC, HCV	N/N	Biliary tract[4]	Cefamet (5), imipenem-cilastatin (9)	E
P15	79	M	Loss of consciousness (1)	1	Sepsis	DM	N/N	Primary	Cefazoline (7)	S
P16	79	F	Fever (1)	4	Lung abscess	DKA	Y/Y	Respiratory tract	Cefuroxime (2)	E
P17	80	M	Dysuria (7)	1	Urinary tract infection	DM, urethral stricture HBV	Y/N	Urinary tract	imipenem-cilastatin (14)	S
P18	51	F	Right limb weakness (2)	4	Pneumonia	Chf	N/N	Respiratory tract	Cefazoline (7), co-trimoxazole (7)	S
P19	80	F	Hematuria (3)	1	Urinary tract infection	Left hydronephrosis, right urethral stone	N/N	Urinary tract	Cefazoline (3), urotactin (11)	S

[1]This patient is case one, and she had received the endoscopic papillotomy one day before the episode of *Acinetobacter baumannii* (*A. baumannii*) bacteremia; [2]This patient had suspected hepatocellular carcinoma; [3]This patient had received the percutaneous transhepatic cholangeal drainage three days before the episode of *A. baumannii* bacteremia, and the route of entry of *A. baumannii* could result from biliary tract. He was categorized to primary bacteremia due to lack of typical clinical symptoms and signs of biliary sepsis; [4]This patient is case two, and she had received the endoscopic retrograde biliary drainage one day before the episode of *A. baumannii* bacteremia. RUQ pain: Right upper quadrant pain; SOB: Shortness of breath; AMI: Acute myocardial infarction; TIA: Transient ischemic attack; CBD: Common bile duct; DM: Diabetes mellitus; DKA: Diabetic ketoacidosis; CHF: Congestive heart failure; HCC: Hepatocellular carcinoma; HBV: Hepatitis B virus; HCV: Hepatitis C virus; AF: Atrial fibrillation; CVA: Cerebrovascular attack; co-trimoxazole: Sulfamethoxazole-trimethoprim; S: Survived; E: Expired; P: Patient number; F: Female; M: Male; Y: Yes; N: No.

the incidence of clinically significant cholangitis have ranged from 0.4% to more than 10% (mean, 1.4%), depending upon the study population[12]. Entrance into the blood stream is presumably through minor trauma by the endoscope[13]. Another factor influencing the rate of cholangitis is the use of prophylactic antibiotics[14]. Results from these studies were similar to the results in our study.

Organisms associated with gastroendoscopy-associated infections

The most frequent organisms responsible for cholangitis and biliary sepsis are enteric bacteria, such as *Escherichia coli, Klebsiella* species, and *Enterobacter* species[2]. *A. baumannii*, which was reported in this study, is rare, so we performed a molecular epidemiological study. Patients 1, 11 and 14 appeared to have had similar fingerprint patterns according to a dendrogram and PFGE (Figure 1), and those 3 patients had experienced invasive gastrointestinal endoscopic procedures. Although we suspect the relationship, we still cannot prove the causal association between the procedure and infection in this study. We lacked direct microbiological evidence as well as estimates of the infection rate in the gastroendoscopy room. Also, there was no significant evidence of endemic *A. baumannii* infection at Changhua County.

In conclusion, we believe that accurate gastroendoscopy techniques and skill in drainage procedures are of paramount importance for minimizing the risk of GEaAb bacteremia. Antibiotic prophylaxis is also widely considered to be indicated in selected patients. Gastroenterologists should give more attention to gastroendoscopy-related infections,

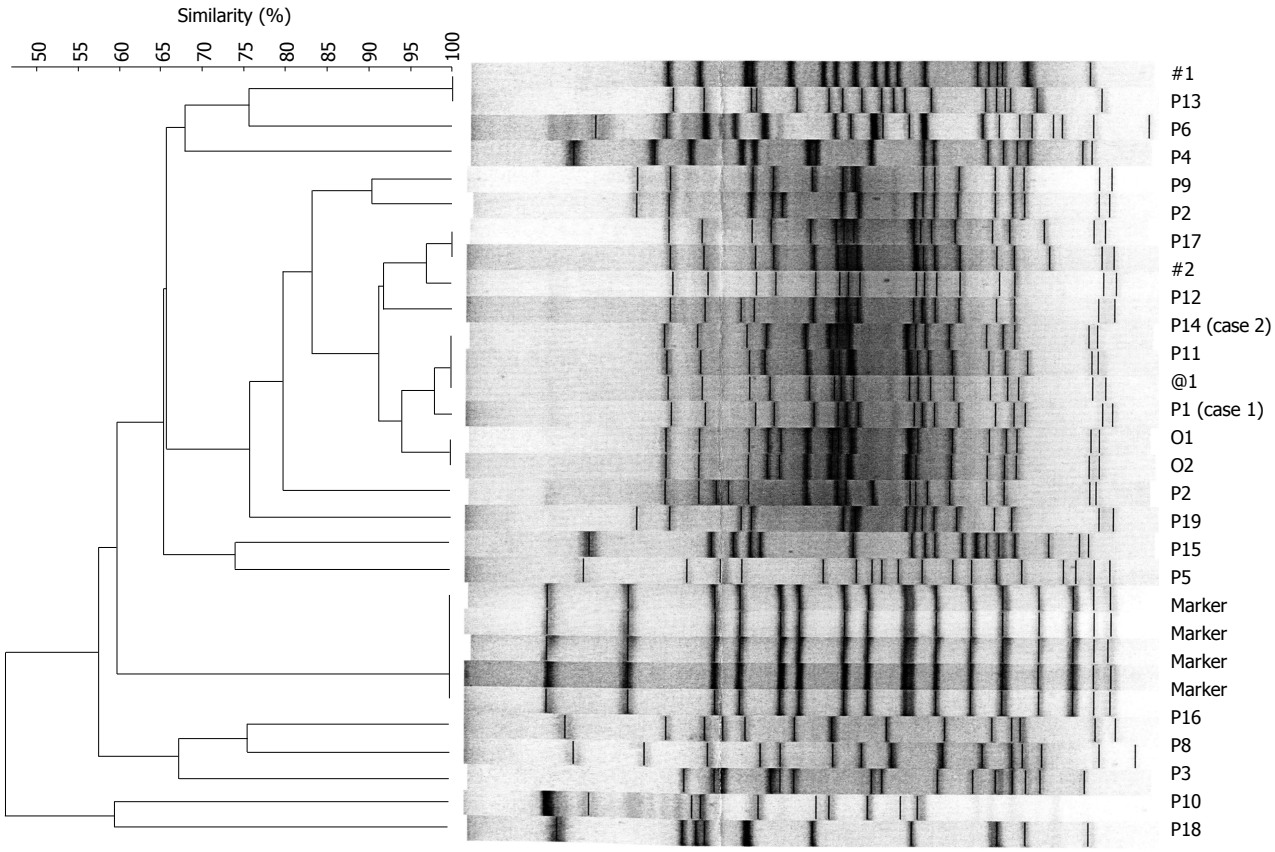

Figure 1 Dendrogram and pulse-field gel electrophoresis patterns of *SgrAI*-digested chromosome DNA of 24 *Acinetobacter baumannii* isolates. #1, #2: Nosocomial *Acinetobacter baumannii* (*A. baumannii*) strain isolated from the same period; @1: Environmental *A. baumannii* strain isolated from the endoscopic room; O1, O2: Outbreak *A. baumannii* strains; P: Clinical *A. baumannii* strains isolated from the numbered patient among 19 non-hospital-acquired *A. baumannii* bacteremia patients.

and increased clinical alertness may be the best way to reduce the impact from these types of infections.

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