

Vibrio fluvialis Liver Abscess and Bacteremia in a Sashimi Lover: A Case Report and Review of the Literature

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Vibrio fluvialis is a foodborne pathogen known to cause a cholera-like gastroenteritis syndrome. Here we report the first case of *V. fluvialis* liver abscess and bacteremia presumed to be from sashimi, a Japanese raw seafood delicacy. We also provide a literature review of reported cases of *V. fluvialis* extra-intestinal diseases including bacteremia.

Keywords. bacteremia; liver abscess; *Vibrio fluvialis*; *Vibrio* species.

Vibrio fluvialis is commonly encountered [1], being the fifth commonest species (6%) among 1252 cases of *Vibrio* infection reported to the Centers for Disease Control and Prevention [2]. *V. fluvialis* is increasingly recognized as a foodborne pathogen associated with poor sanitation and increased seafood consumption [1]. Acute gastroenteritis is the most common presentation, although extra-intestinal infections have been reported infrequently [1]. Here, we report a case of *V. fluvialis* liver abscess with concomitant bacteremia and review the literature regarding extra-intestinal, including bacteremic, *V. fluvialis* infections.

CASE PRESENTATION

A 65-year-old man with a history of pancreatic head cancer and surgically resected bladder cancer presented to the outpatient clinic following 1 week of lethargy. He denied any abdominal pain, diarrhea, or other gastrointestinal symptoms. He was expected to receive chemotherapy for pancreatic cancer; however, he was admitted to the internal medicine ward because of profound hypotension and tachycardia. Twelve months before, pancreatic duct dilation was incidentally noted on follow-up computed tomography for bladder cancer. He was subsequently diagnosed with pancreatic head cancer following bile duct biopsy via endoscopic retrograde cholangiopancreatography. He underwent 2 biliary stent placements and 2 chemotherapy courses with gemcitabine and nab-paclitaxel 7 months before

presentation. He gradually lost appetite and mainly consumed sashimi, a Japanese seafood delicacy, purchased at a nearby fish market on a daily basis.

Upon admission, he was alert and oriented with mild lethargy. Physical examination revealed moderate conjunctival pallor, but no focal findings, including abdominal tenderness or peritoneal signs. Complete blood count results were as follows: white blood cell count, $21.5 \times 10^3/\mu\text{L}$; hemoglobin, 7.7 mg/dL; and platelet count, $34.4 \times 10^4/\mu\text{L}$. Liver enzyme levels were as follows: aspartate transaminase, 34 U/L; alanine transaminase, 20 U/L; gamma-glutamyl transpeptidase, 132 U/L; alkaline phosphatase, 652 U/L; and total bilirubin, 0.5 mg/dL. Urinalysis and chest radiogram were unremarkable. Abdominal ultrasound revealed a low echogenic lesion ~20 mm in size in segment 6 of the liver. This finding was confirmed with computed tomography with intravenous contrast, which showed a newly identified space-occupying lesion compatible with liver abscess in the corresponding location (Figure 1A). He subsequently underwent fluid resuscitation and percutaneous transhepatic abscess aspiration with empiric piperacillin-tazobactam. The following day, blood cultures and aspirate from the liver abscess were positive for gram-negative bacilli (Figures 1B and C). Matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS; Bruker, Billerica, MA, USA) identified *V. fluvialis* (score of 2.129). Antimicrobial susceptibility testing revealed that the isolate was sensitive to ampicillin, ampicillin/sulbactam, piperacillin/tazobactam (minimal inhibitory concentration of 8 $\mu\text{g}/\text{mL}$), cefmetazole, ceftriaxone, ceftazidime, cefepime, aztreonam, meropenem, amikacin, minocycline, and levofloxacin. Because the abscess failed to decrease in size with the initial antibiotic treatment alone, minocycline and piperacillin/tazobactam were administered, along with additional biliary stent placement and percutaneous transhepatic abscess drainage.

After 3 weeks of parenteral antibiotic treatment, the regimen was switched to enteral clindamycin and minocycline. He was discharged and completed 6 weeks of treatment, achieving

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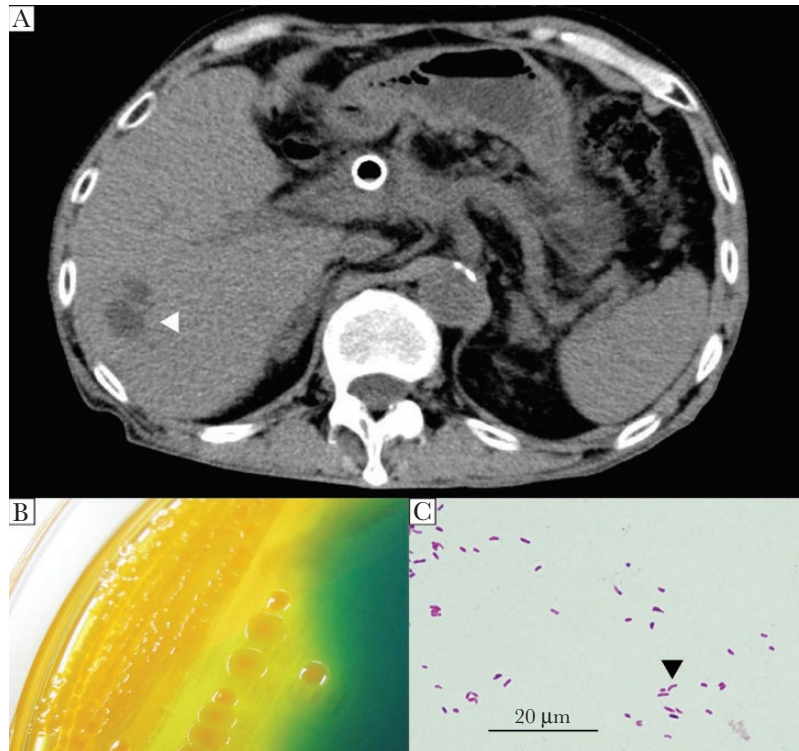


Figure 1. A) A computed tomography scan depicting a low-density area compatible with liver abscess (white arrow). B) *Vibrio fluvialis* colony growing on thiosulfate-citrate-bile-sucrose agar plate. C) Gram stain of blood culture depicting curved gram-negative bacilli (black arrow).

radiographic liver abscess resolution. The patient died from progression of pancreatic head cancer 6 months after this episode without any recurrence of *V. fluvialis* infection.

DISCUSSION

V. fluvialis is prevalent in aquatic environments and seafood, which are the main risk factors for acquiring the disease [1]. Gastroenteritis is the most common clinical manifestation [1], and only few extra-intestinal infections have been reported [1]. Here, we review clinically relevant reports of 7 extra-intestinal infection cases including 7 bacteremia cases (Table 1) [3–13]. Cases were mainly from island and peninsular regions [3–13]. Patients were typically middle-aged, with a 52-year median age, except for 1 infant [3–13]. There was no sex difference overall; however, 5 of 6 bacteremia cases occurred in male patients with ≥ 1 comorbidity, primarily diabetes mellitus [3–13]. Water or seafood exposure was noted in approximately half of cases [3–13]. Most bacteremia cases resulted from severe gastroenteritis, and 50% of patients died [3–13]. Extra-intestinal cases included 2 peritonitis cases, 1 hemorrhagic cellulitis, cerebritis, otitis externa, urinary tract infection, and cholangitis case; however, liver abscess has never been reported. Treatment was variable across cases, although combination therapy involving beta-lactams and agents, including aminoglycosides, quinolones, and tetracyclines, was used [3–12].

The scarcity of extra-intestinal and bacteremia cases may partly be because of difficulty in identifying *V. fluvialis* [1]. Although classical thiosulfate-citrate-bile salts-sucrose agar medium and biochemical assays, including API20E and Vitek GNI+ systems, are often used for identification, different *Vibrio* species may show similar results [1]. *V. fluvialis* is closely related to *V. furnissii*, and differentiation may be difficult [12, 14]. Both species were originally classified as *V. fluvialis*; however, *V. furnissii* was later distinguished as separate owing to its gas-producing capability [14]. Besides biochemical identification methods, more reliable identification methods include polymerase chain reaction (PCR) DNA testing or MALDI-TOF MS [12, 14]. PCR results, using *rpoB* and the more conventional *toxR* gene segment, and MALDI-TOF MS results completely agreed in 1 study [14].

In line with reported cases, our patient was a middle-aged man with biliary tract disease owing to pancreatic cancer who was receiving chemotherapy. MALDI-TOF MS (Bruker, USA) reliably identified *V. fluvialis*. We presume that he acquired *V. fluvialis* from sashimi. Both the liver abscess and bacteremia were successfully treated with combination therapy and aggressive drainage.

In summary, while gastroenteritis is the most common presentation, extra-intestinal *V. fluvialis* infection is uncommon and exhibits high mortality. Heavy seafood consumption is a major risk factor [1]. As raw seafood consumption is getting more common than before worldwide, physicians should consider *V. fluvialis* infection alongside other *Vibrio* species in patients with heavy exposure to seafood, including sashimi.

Table 1. Literature Review of Extra-intestinal Infection Including Bacteremia by *V. fluvialis*

Case	Age, y	Sex	Country	Site of Disease	Bacteremia	Underlying Disease	Route of Acquisition	Treatment	Outcome	Reference
1	40	Female	Taiwan	Otitis externa	No	None	Seawater exposure	AMPC/CVA	Survived	3
2	88	Female	Taiwan	Cholangitis	No	DM, ESRD, cirrhosis, intrahepatic ductal stones	None	PIPC/TAZ + trans-hepatic biliary drainage	Survived	4
3	52	Female	South Korea	Peritonitis	No	None, postabdominal blunt injury from traffic accident	None	Cephamycin + netilmicin, PIPC/TAZ + MNZ, cefoperazone + prepenem + amikacin	Died	5
4	40	Female	USA	Gastroenteritis catheter	Yes	DM, hypertension, ESRD (on HD)	Seawater exposure	CTRX + DOXY, gatifloxacin	Survived	6
5	66	Male	Korea	Unknown	Yes	Gastric cancer	NA	NA	Died	7
6	70	Male	Korea	Gastroenteritis	Yes	DM, hypertension, gastric cancer	NA	SBT/CPZ + ISP	Survived	7
7	65	Male	Taiwan	Gastroenteritis	Yes	DM, chronic liver disease	None	CXM to ST	Survived	8
8	55	Female	New Zealand	Peritonitis	No	ESRD (on CAPD), DM	Seafood	CTRX CPFX AMPC + GM ip	Survived	9
9	45	Male	Taiwan	Hemorrhagic cellulitis cerebritis	Yes	Alcoholic liver disease	Fire ant bites, brackish water exposure	OXA + GM CAZ + oxytetracycline + fasciotomy + left transfemoral amputation	Died	10
10	5 mo	Male	Bangladesh	Gastroenteritis	Yes	Malnutrition	NA	ABPC + GM + aminocillin pivoxil	Died	11
11	52	Female	Lebanon	Urinary tract infection	No	Fibroid uterus, post-total abdominal hysterectomy and bilateral oophorectomy	Home tap water	CPFX	Survived	13
12	65	Male	Japan	Liver abscess	Yes	Malnutrition, pancreatic cancer, bladder cancer (surgically resected)	Seafood	PIPC/TAZ + MINO, CLDM + MINO, biliary stent placement, PTAD	Survived	Our case

Abbreviations: ABPC, ampicillin; AMPC, amoxicillin; AMPC/CVA, amoxicillin/clavulanate; CAPD, continuous ambulatory peritoneal dialysis; CAZ, ceftazidime; CLDM, clindamycin; CPFX, ciprofloxacin; CTRX, ceftriaxone; CXM, cefuroxime; DM, diabetes mellitus; ESRD, end-stage renal disease; GM, gentamicin; HD, hemodialysis; ip, intraperitoneal; ISP, isepamicin; MINO, minocycline; NA, not available; OXA, oxacillin; PIPC/TAZ, piperacillin/tazobactam; PTAD, percutaneous transhepatic abscess drainage; SBT/CPZ, sulbactam-cefoperazone; ST, trimethoprim-sulfamethoxazole.

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Author contributions. All authors cared for the patient, performed literature search, wrote the draft, and critically reviewed the draft.

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