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Case report

Bacteremia associated with cholangitis caused by *Comamonas testosteroni*: Report of the first case worldwide

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Abstract

Introduction: Cholangitis is an infection of the biliary tract usually caused by gram-negative bacilli. Comamonas testosteroni is a bacterium commonly found in the environment; however, it is not part of the human microbiome. To date, no cases of bacteremia secondary to cholangitis caused by C. testosteroni have been described. **Case presentation:** A 77-year-old female patient with benign biliary stenosis and recurrent choledocholithiasis presented with Tokyo II cholangitis, with isolation of multidrug-susceptible C. testosteroni in both blood cultures and bile fluid culture, showing the same susceptibility profile. She received ten days of antibiotic treatment with piperacillin/tazobactam, and follow-up blood cultures were negative. Definitive management included biliary tract dilation with SpyGlass, during which biopsies were taken and showed severe chronic and acute inflammatory changes with reactive epithelial changes, negative for malignancy, with favorable clinical progression. **Discussion:** Infection in humans caused by Comamonas species is unusual, and the most frequent species is C. testosteroni, mainly associated with intra-abdominal infections (most secondary to perforation of the cecal appendix). MALDI-TOF (Matrix Assisted Laser Desorption Ionization Time of Flight) has become a useful tool for differentiating Comamonas species. **Conclusion:** C. testosteroni is a possible causative agent of cholangitis. The arrival and expansion of technologies such as MALDI-TOF make it possible to identify unusual microorganisms and guide treatment.

Keywords

Comamonas testosteroni, bacteremia, cholangitis.

INTRODUCTION

Cholangitis is an infection of the biliary tract associated with a mortality rate of 5%–10% and bacteremia rates of up to 50%. The most common microorganisms isolated from bile are *Escherichia coli* spp. (27%), *Klebsiella* spp. (16%), *Enterococcus* spp. (15%), *Streptococcus* spp. (8%), *Enterobacter* spp. (7%), and *Pseudomonas aeruginosa* (7%). Polymicrobial infection is present in up to 60% of positive bile cultures. In cases of bacteremia, the microorganisms are similar: *E. coli* (59%), *Klebsiella* spp. (16%), *P. aeruginosa* (5%), and *Enterococcus* (4%)[(1)].

Comamonas testosteroni is an environmental bacterium that is not part of the human microbiome. Although cases of intra-abdominal infection caused by *C. testosteroni*, including appendicitis, peritonitis, and diverticulitis, have been reported[(2)], no cases of bacteremia secondary to cholangitis caused by this microorganism have been reported. In 2017,

Farooq et al. hypothesized that biliary secretions are rich in fatty acids and that, theoretically, *C. testosteroni* could thrive in the bile-rich environment of the gallbladder[2]. We present the first reported case of bacteremia secondary to cholangitis caused by *C. testosteroni*.

CASE PRESENTATION

A 77-year-old woman of mestizo ethnicity with a history of type 2 diabetes mellitus, benign biliary stricture, and recurrent choledocholithiasis presented with a biliary stent that had been placed six months before presentation and exchanged three months before admission. She was awaiting definitive management of the biliary stricture with advanced cholangioscopy using a digital endoscope (SpyGlass)[3,4].

She presented with a one-week history of fever, anorexia, asthenia, and generalized jaundice. Initial laboratory studies showed leukocytosis, neutrophilia, and predominantly direct hyperbilirubinemia (**Table 1**). Ultrasonography showed intrahepatic biliary ductal dilation, with the right hepatic duct confluence measuring 5 mm and the left measuring 6 mm, as well as a proximal common bile duct measuring 6 mm. She was diagnosed with grade II cholangitis according to the 2018 Tokyo Guidelines[5], and piperacillin/tazobactam was initiated at a dose of 4.5 g intravenously every 6 hours.

The patient underwent endoscopic retrograde cholangiopancreatography (ERCP) with a Pentax Medical duodenoscope, which had previously been cleaned according to the institutional protocol using enzymatic detergent diluted in water. A partially displaced plastic stent was identified and subsequently removed and replaced with a new stent. Blood samples were obtained at that time, and *C. testosteroni* with susceptibility to all tested antimicrobials was isolated from one of three blood culture bottles at 12 and 24 hours. Microbiological identification was performed using matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS), and antimicrobial susceptibility testing was performed using the automated Vitek 2® system. The organism's susceptibility profile is presented in **Table 2**.

The same microorganism, with the same susceptibility profile, was isolated from the bile fluid culture, along with five other microorganisms: multidrug-susceptible *Klebsiella oxytoca*, multidrug-susceptible *E. coli*, vancomycin-resistant *Enterococcus casseliflavus*, *Streptococcus salivarius* spp., and *Candida glabrata*. A 10-day course of antibiotic therapy was completed, with an adequate clinical response characterized by resolution of fever and other signs of systemic response, as well as progressive normalization of the complete blood count and liver function tests (**Table 1**). Follow-up blood cultures obtained five days after initiation of antibiotic therapy were negative. Given her favorable clinical course, the patient was discharged from the hospital.

Table 1. Changes in the most relevant laboratory findings at admission and on hospital day 7

Laboratory parameter	Admission (day 1)	Discharge (day 7)
White blood cell count (cells/mm³)	12.400	6300
Hemoglobin (g/dL)	14.1	12.1
Hematocrit (%)	44	38
Mean corpuscular volume (fL)	82.4	84.2
Mean corpuscular hemoglobin (pg)	26.5	26.8
Mean corpuscular hemoglobin concentration (g/dL)	32	31.8
Platelet count (cells/mm³)	318.000	259.000
Lymphocytes (cells/mm³)	300	1300
Neutrophils (cells/mm³)	11.700	4400
Erythrocyte sedimentation rate (mm/h)	7	28
Creatinine (mg/dL)	0.68	0.75
BUN (mg/dL)	16	14
Total bilirubin (mg/dL)	9.31	2.06
Direct bilirubin (mg/dL)	6.82	1.43
Indirect bilirubin (mg/dL)	2.49	0.63
Aspartate aminotransferase (U/L)	139	58
Alanine aminotransferase (U/L)	105	49

BUN: blood urea nitrogen; ESR: erythrocyte sedimentation rate. Table prepared by the authors.

After completing the antibiotic course as an outpatient, she underwent ERCP with SpyGlass and removal of the plastic stent. The distal common bile duct was normal, whereas a mid-common bile duct stricture was identified, with intrahepatic biliary ductal dilation of up to 12 mm. Multiple biopsies were obtained, and a 6-cm metal stent was placed. The final biopsy report showed a severe acute and chronic inflammatory process with reactive epithelial changes and no evidence of malignancy.

The patient had a favorable postprocedural course. She was discharged in stable clinical condition, with a plan for stent exchange and a satisfactory six-month follow-up conducted by telephone.

Table 2. Antimicrobial susceptibility profile of *Comamonas testosteroni* isolates

Antibiotic	Minimum inhibitory concentration (MIC)	Interpretation according to CLSI breakpoints
Blood culture		
Amikacin	8	S
Cefazolin	≤4	S
Cefepime	≤0.12	S
Ceftazidime	0.5	S
Ciprofloxacin	≤0.06	S
Gentamicin	≤1	S
Meropenem	≤0.25	S
Piperacillin/tazobactam	≤4	S
Bile secretion		
Amikacin	8	S
Cefazolin	≤4	S
Cefepime	≤0.12	S
Ceftazidime	0.25	S
Ciprofloxacin	≤0.06	S
Gentamicin	≤1	S
Meropenem	≤0.25	S
Piperacillin/tazobactam	≤4	S

CLSI: Clinical and Laboratory Standards Institute; S: susceptible. Table prepared by the authors.

DISCUSSION

We present the first case report of bacteremia secondary to cholangitis caused by *C. testosteroni*. The patient was a woman with a history of benign biliary stricture and recurrent choledocholithiasis who had required two stent exchanges.

The genus *Comamonas* includes several species with a broad environmental distribution. These organisms are aerobic, oxidase-positive, nonfermenting gram-negative bacilli. Human infection caused by *Comamonas* species is uncommon. The most frequently reported species is *C. testosteroni*, which is primarily associated with intra-abdominal infections, most of which are secondary to cecal appendix perforation. However, cases of endocarditis, meningitis, endophthalmitis, urinary tract infection, and intravascular catheter-associated infections have also been reported. The microorganism derives its name from its ability to metabolize testosterone as its sole carbon source through a meta-cleavage reaction[6].

Detection of *Comamonas* is generally performed using systems such as the Vitek 2® Compact, Phoenix, or API NE galleries. Cases have been reported in which *C. testosteroni* was identified as the etiologic agent; however, when processed by MALDI-TOF (matrix-assisted laser desorption/ionization time-of-flight), the organism was identified as *Comamonas kestersii*[7]. MALDI-TOF has become an established and useful tool for differentiating *Comamonas* species[8]. *C. testosteroni* is usually susceptible to many antibiotics, including aminoglycosides, cephalosporins, fluoroquinolones, carbapenems, piperacillin/tazobactam, and trimethoprim-sulfamethoxazole[9]. In our case, Vitek 2® and MALDI-TOF techniques were used, identifying multidrug-susceptible *C. testosteroni*. This finding highlights the importance of the advent and widespread adoption of this method for identifying additional *Comamonas* species as causes of human infection.

A literature search of MEDLINE and Embase using the term "*Comamonas testosteroni*," from 1987—the year in which the current nomenclature was adopted, as the organism had previously been referred to as *Pseudomonas testosteroni*—through March 06, 2025, identified 28 studies corresponding to case reports of *C. testosteroni* infection in humans[10-31]. The most relevant clinical data are presented in **Table 3**. Most cases were reported in India, Turkey, Israel, and the United States, primarily among women and at the extremes of age. However, the age range was 4–84 years. Seven patients had cancer and five had chronic kidney disease (CKD) as significant comorbidities. Bacteremia was documented in 14 patients, with the gastrointestinal tract being the main infectious focus. In addition, substantial variation in antibiotic regimens was observed. The most commonly used empirical therapies were glycopeptides, second- or fourth-generation cephalosporins, quinolones, and aminopenicillins such as piperacillin/tazobactam, which was effective in our case.

CONCLUSION

This report has the limitations inherent to a single-case report. However, it highlights *C. testosteroni* as a causative agent of cholangitis and documents the presence of a very uncommon pathogen in Colombia. It also underscores the importance of the advent of new technologies for identifying pathogens that present new challenges in medicine.

Ethical considerations

The case report was reviewed and approved by the Ethics Committee of Hospital Universitario San Ignacio. The report was prepared in accordance with the principles of the Declaration of Helsinki.

Table 3. *Comamonas testosteroni* infections reported in the literature

Year	Author	Location	Age (years)	Sex	Diagnosis	Specimen	Treatment	Bacteremia	Outcome
2023	Buyukberber S, Mumcouglu I, Orkun B, Aypak A, Dinc B[10]	Turkey	4	Female	Urosepsis in a patient with a colostomy and recurrent urinary tract infections	Urine culture	Ceftazidime and amikacin	No	Alive
2022	Kuźniewicz R, Śnit m, Szczyra D[9]	Poland	72	Female	Diabetes and hypertension with chronic kidney disease on peritoneal dialysis and a focal liver lesion suggestive of primary hepatocellular carcinoma or metastasis	Dialysate fluid culture	Intraperitoneal ceftazidime	No	Alive
2022	Sammoni A, Abdalah A, Al-Aissami M[11]	Syria	16	Male	Central venous catheter-associated bacteremia in a patient with a burn	Blood culture	Ceftriaxone and cefazolin	No	Alive
2022	Abraham J, Simon G[12]	Israel	54	Female	Bacteremia in a patient with esophageal cancer metastatic to the lung	Blood culture	Cefepime, vancomycin, and azithromycin	Yes	No
2021	Miloudi M, Kamouni Y, Oulhadj H, Arsalane L, Zouhair[13]	Morocco	12	Unknown	Appendicitis	Peritoneal fluid culture	Amoxicillin and clavulanic acid	No	Alive
2021	Dabaja-Younis, et al[14]	Israel	7 patients younger than 18 years	Not reported	Perforated appendicitis	Peritoneal fluid	Not reported	Not reported	Not reported
2020	Tiwari S, Nanda M[15]	India	46	Female	Bacteremia	Blood and urine cultures	Piperacillin/tazobactam and vancomycin, subsequently changed to gentamicin and imipenem for 10 days because of piperacillin/tazobactam resistance	Yes	Alive
2020	Sağmak A, Tartar T[16]	Turkey	14	Male	Appendicitis	Peritoneal fluid culture	Cefazolin, amikacin, and metronidazole	No	Alive
2020	Sağmak A, Tartar T[16]	Turkey	5	Female	Appendicitis	Peritoneal fluid culture	Cefazolin, amikacin, and metronidazole	No	Alive
2017	Farooq S, Farooq R, Nahvi N[2]	India	6	Female	Inflammatory diarrhea	Stool culture	Oral ciprofloxacin	No	Alive
2017	Hung Y, Chang Y, Kao C[17]	Taiwan	6	Female	Appendicitis	Blood culture	Cefazolin followed by ceftriaxone	Yes	Alive
2016	Khalki H, Deham H, Taghouti A, Yahyaoui G, Mahmoud S[32]	France	18	Male	Perforated appendicitis	Peritoneal fluid	Amoxicillin and clavulanic acid for 6 days	No	Alive
2016	Parolin M, Baraldi M, Valentini E, Murer L, Vidal E[19]	Italy	4	Female	Recurrent peritonitis in a patient with chronic kidney disease and recurrent dialysis	Peritoneal fluid culture	Ceftazidime-avibactam and teicoplanin	No	Alive
2015	Swain B, Rout S[20]	India	50	Female	Diabetes mellitus and chronic kidney disease with bacteremia	Blood culture	Piperacillin/tazobactam, subsequently changed to cefoperazone-sulbactam	Yes	Alive

Table 3. *Comamonas testosteroni* infections reported in the literature (*continued*)

Year	Author	Location	Age (years)	Sex	Diagnosis	Specimen	Treatment	Bacteremia	Outcome
2014	Orsini J, Tam E, Hauser N, Rajayer S[21]	United States	80	Female	Bacteremia	Blood culture	Cefazolin combined with doripenem	Yes	Alive
2013	Bayhan G, Tanir G, Karaman, Ozkan S[18]	Turkey	16	Male	Appendicitis	Peritoneal fluid culture	Amikacin, ampicillin, and clindamycin	No	Alive
2013	Altun E, Kaya B, Taktakoglu O, Karaer R, Paydas S, Balal M, Seyrek N[22]	Turkey	29	Female	Peritonitis secondary to intrauterine device displacement in a patient with chronic kidney disease	Peritoneal fluid culture	Oral ciprofloxacin and intravenous vancomycin	No	Alive
2012	Farshad S, Norouzi F, Aminashahidi M, Heidari B, Alborizi A[23]	Iran	10	Male	Bacteremia in a patient with medulloblastoma	Blood culture	Ciprofloxacin and amikacin for 21 days	Yes	Alive
2012	Farshad S, Norouzi F, Aminashahidi M, Heidari B, Alborizi A[23]	Iran	19	Female	Bacteremia in a patient with sarcoma	Blood culture	Vancomycin and imipenem for 14 days, followed by ciprofloxacin	Yes	Alive
2011	Nseir W, Khateeb J, Awawdeh M, Ghali M[24]	Israel	64	Female	Bacteremia in a patient with diabetes and chronic kidney disease	Blood cultures	Vancomycin and ceftriaxone	Yes	Alive
2011	Tsui T, Tsao S, Liu K, Chen T, Wang Y, Teng Y, Lee Y[25]	Taiwan	54	Unknown	Bacteremia and cellulitis	Blood cultures	Oxacillin	Yes	Alive
2011	Tsui T, Tsao S, Liu K, Chen T, Wang Y, Teng Y, Lee Y[25]	Taiwan	73	Male	Bacteremia in a patient with hepatocarcinoma	Blood cultures	Cefmetazole and gentamicin, subsequently adjusted to levofloxacin	Yes	Alive
2009	Reedy A, Murthy S, Jalali S, Gopinathan U[26]	India	82	Female	Endophthalmitis in a patient with diabetes mellitus	Vitreous fluid culture	Vancomycin and ceftazidime	No	Alive
2008	Jin L, Perper J, Cina S[27]	United States	54	Male	Bacterial meningitis	Autopsy and culture of a brain surface swab	Moxifloxacin	No	Deceased
2007	Gul M, Ciragil P, Bulbuloglu E, Aral M, Alkis S, Aumeyra A, Ezberci F[28]	Turkey	22	Male	Perforated appendicitis	Blood cultures	Cefazolin	Yes	Alive
2005	Cooper G, Staples E, Iczkowski K, Clancy C[29]	United States	49	Male	Endocarditis	Blood culture	Cefepime and gentamicin, subsequently adjusted to ampicillin	Yes	No
2003	Arda B, Aydemir S, Yamazhan T, Hassan A, Tunger A, Serter D[30]	Turkey	50	Male	Meningitis in a patient with a history of cholesteatoma repair	CSF culture	Ceftriaxone, ceftazidime, and meropenem	No	Alive
2001	Le Moal G, Paccalin M, Breux J, Roblot F, Roblot P, Giraudon B[31]	France	75	Female	Postchemotherapy bacteremia in a patient with breast cancer with a central venous catheter	Blood cultures	Ceftazidime and gentamicin with catheter removal	Yes	Alive

IUD: intrauterine device; CKD: chronic kidney disease; IV: intravenous; UTI: urinary tract infection; CSF: cerebrospinal fluid. Table prepared by the authors.

Informed consent

The patient provided written informed consent for publication of the case, including any information and images that could identify her.

Conflicts of interest

The authors declare no conflicts of interest related to this publication.

Use of artificial intelligence

The authors of this article declare that no artificial intelligence-assisted technologies were used.

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Author contributions

- Study design and conception: Ana Goyeneche-García, Óscar Muñoz-Velandia.
- Data acquisition: Ana Goyeneche-García, Laura Omaña-Álvarez.
- Data analysis and interpretation: Ana Goyeneche-García, Óscar Muñoz-Velandia, Cándida Diaz-Brochero, Laura Omaña-Álvarez.
- Manuscript drafting: Ana Goyeneche-García, Cándida Diaz-Brochero, Laura Omaña-Álvarez.
- Critical revision of the manuscript: Cándida Diaz-Brochero, Óscar Muñoz-Velandia.

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