



## Case study

Isolation of *Shewanella putrefaciens* in an elderly man with subacute intestinal obstruction & appendicitisArif Maqsood Ali<sup>a,\*</sup>, Muhammad Noorulamin<sup>a</sup>, Shazia Arif<sup>b</sup><sup>a</sup> Department of Pathology and Blood Bank, Rawalpindi Institute of Cardiology, Pakistan<sup>b</sup> AMC, Pakistan

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## ABSTRACT

*Shewanella* is Gram-negative motile bacillus, non fermentative and facultative anaerobe. Its natural habitat is all forms of water and soil, but has also been isolated from fish, dairy products, oils, and carcasses. Often found with microflora of the marine environment. Bacterial infections with *Shewanella* spp. are rare. The exposure to the marine environment, sea and dairy food are considered as a risk factor for *Shewanella* spp. infection. Clinical infections seen are otitis, soft tissue infection, bacteremia, ear infection, eye infection, infective arthritis, osteomyelitis, infective endocarditis and peritonitis.

We present a case report of an old man operated by Laparoscopic appendectomy in a tertiary care hospital for subacute intestinal obstruction & peritonitis. He had past history of chronic constipation & hemorrhoids. On examination, he was febrile & had tenderness in right renal area. X rays Abdomen showed minimal air fluid levels in small intestines also confirmed on Ultrasound abdomen. Initially, he was managed conservatively and on intravenous antibiotics. However, he did not improve and was operated by laproscopic appendectomy. Peritoneal fluid was cultured which yielded the growth *Schewanella putrefaciens*. The patient showed smooth recovery on intravenous antibiotics.

## Introduction

The genus *Shewanella* is Gram-negative motile bacillus, non fermentative and facultative anaerobe [1]. The first description of the species was provided in 1931 by Derby and Hammer. They had isolated an unknown bacteria from putrefied butter and water supplies of dairies which was named as *Achromobacter putrefaciens* [2] In 1985, on the basis of phenotypical features like temperature requirement, salt tolerance and saccharolytic activity it was reclassified into a genus *Shewanella* [3]. Its natural habitat is all forms of water and soil, but has also been isolated from fish, dairy products, oils, and carcasses [4]. It is often found with microflora of the marine environment with *Vibrio parahaemolyticus*, *Aeromonas hydrophila*, *Plesiomonas*, and various enteric bacteria [5].

Infections with *Shewanella* spp. are rare. It has been reported from areas with warm climates and after exposure to seawater. The exposure

to the marine environment is considered as a risk factor for *Shewanella* spp. infection. Clinical infections seen are otitis, soft tissue infection, bacteremia, and hepatobiliary infection [6]. Chronic leg ulcer, peripheral vascular occlusive disease, diabetes mellitus, chronic liver and kidney diseases predispose to *Shewanella* infections. Other clinical manifestations include skin and soft tissue infections, ear infection, eye infection, infective arthritis, osteomyelitis, bacteraemia, infective endocarditis and peritonitis [7].

## Case report

A 70-year-old Pakistani male was operated by Laparoscopic appendectomy in a tertiary care hospital on 24 Dec 2016. He was normoglycemic, normotensive, non smoker & had sedentary life style. He had past history of chronic constipation & hemorrhoids. He had normal dietary habits which also included sea fish. A week before operation he complained of dull upper abdominal pain in both hypochondria. There was no history of vomiting but history of constipation for two days. Thereafter he did not pass flatus. His pain increased in severity which increased on lying down.

On examination, he was febrile & had tenderness in right renal area. His tongue was coated. There was tachycardia & rapid shallow breathing. He had temperature of 102°F, pulse of 90/min & BP of 140/90 mm Hg. There was bilateral pitting edema. Systemic examination did not reveal any abnormality. X rays Chest were normal. X rays Abdomen showed minimal air fluid levels in small intestines. The same were also confirmed on Ultrasound abdomen. Gall bladder was found filled with bile & had multiple stones. There was no mass, free fluid &

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intestinal lymph node. His blood complete picture showed a WBC count of  $18 \times 10^9/\text{ul}$ . Blood chemistry & urine routine examination was normal. His CRP was 90 mg/dl. ECG was normal. Echocardiography showed mild pericardial effusion.

Patient was managed conservatively. He was kept nothing per oral, administered iv fluids (Normal saline), iv antibiotics which included inj Metronidazole (Flagyl) 500 mg & inj Piperacillin/Tazobactam (Tazocin) 3.375 g 8 hourly. He passed stool after 48 h & his pain subsided. Oral fluids were started & patient given Tab Flagyl 400 mg 8 hourly & Tab Ciprofloxacin 500 mg 12 hourly. However, he again became febrile with abdominal distention. Blood cultures did not yield any growth. Ultrasound abdomen and High-resolution CT (HRCT) Abdomen showed small intestinal dilated loops with minimal air fluid level. There was fluid collected in right iliac fossa. Patient was operated for laproscopic appendectomy. However, his appendix was missing in right iliac fossa & found in right hypochondrium. Multiple adhesions were seen extending from appendix to caecum & ileum with free fluid collection in peritoneal cavity. The adhesions were resected & peritoneal lavage done with normal saline. Histopathology showed an inflamed & hemorrhagic appendix. Peritoneal fluid culture yielded the growth of oxidase positive, motile, non lactose fermenting Gram negative rods. The organism was  $\text{H}_2\text{S}$  producing & nitrate positive. It was identified as *Shewanella putrefaciens* by Analytical Profile Index API<sup>®</sup> 20E standardized system (Biomérieux, Marcy l'Etoile, France).

The organism was susceptible to Levofloxacin, Trimethoprim/Sulphamethoxazole, Amikacin, Piperacillin/Tazobactam. It was resistant to Amoxicillin, Amoxicillin clavunate, Ciprofloxacin, Cefixime, Cefoperazone and Carbapenems – Imipenem & Meropenem. Post operatively, patient was managed on Inj Tazocin & Inj Levofloxacin. Patient showed smooth recovery & oral fluids started after 48 h. His WBC count & CRP returned to normal after 05days.

## Discussion

*Shewanella* spp. infections include soft tissue infections, ear infections, abdominal infections and biliary tract infections. It has been reported from Taiwan, South Africa, Belgium, South Korea, Denmark, Turkey, USA and India. These infections are frequently associated with underlying conditions and complications [8,9].

These are most commonly isolated in skin and soft tissue infections, associated with breaches in the skin such as ulcers or following trauma. Nicolas Vignier et al. have reported *Shewanella* spp. in abdominal and biliary tract infections. They reviewed the isolate in ten biliary tract infections, two with cholecystitis, five with peritonitis, one each with abdominal wall abscess and paracolic abscess. The portal of entry in these infections was digestive [9]. *Shewanella* spp. has also been reported as pathogens causing intra-abdominal infections [10].

The frequency of hepatobiliary infections suggests that *Shewanella* spp. may also be a commensal in gastrointestinal flora. The patient reported by us might have acquired the organism from the sea food in his diet or as a hospital acquired infection. *Shewanella putrefaciens* is often isolated from cases of polymicrobial infection. Most of the other bacteria isolated from such polymicrobial infections belong to enterobacteriaceae, but bacteria of marine flora have also been found [11,12].

We report the first case of peritoneal infection from Pakistan caused by *Shewanella putrefaciens*. We have isolated a pure growth of *Shewanella putrefaciens* from an aspirate of peritoneal fluid following Laproscopic appendectomy. *S. putrefaciens* is the only oxidase positive

Gram negative bacteria that produce  $\text{H}_2\text{S}$  and reduces nitrate.

Blandari et al., reported a wound infection from Iran caused by *S. algae* in a healthy young man without any underlying disease. They isolated a pure culture from purulent discharge from umbilical infection contaminated with sea environment. Cemal and his colleague have also reported a rare wound infection caused by *S. putrefaciens* in Turkey [13].

There are no guidelines for *Shewanella* spp antibiotic susceptibility. Since, *Shewanella* spp. is oxidase positive, laboratories tend to test broad-spectrum antibiotics. *Shewanella* spp. is susceptible to commonly used antimicrobial agents, particularly third-generation Cephalosporins, Piperacillin, Ciprofloxacin and Gentamicin. Resistance to Imipenem due to oxacillinase has been reported in *Shewanella* spp [14].

Our isolate was resistant to Amoxicillin, Amoxicillin clavunate, Ciprofloxacin, third-generation Cephalosporins and Carbapenems. However, the isolate was susceptible to Trimethoprim/Sulphamethoxazole, Levofloxacin, Amikacin & Piperacillin/Tazobactam. This is in contrast to the findings of other investigators that *S. algae* and *S. putrefaciens* are characteristically susceptible to aminoglycosides, carbapenems and quinolones but resistant to penicillins [10,11,15]. It may be due to the frequent use of these antibiotics in our set up.

Infection with *Shewanella* spp. infections should be considered in environmental context (tropical area, sea food, water exposure & hospital setup). Epidemiologic studies are required to confirm these observations.

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