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# Dengue co-infection in a blood stream infection caused by *Stenotrophomonas maltophilia*: A case report

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## CASE STUDY

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## ABSTRACT

*Stenotrophomonas maltophilia (S. maltophilia)* is an emerging opportunistic bacterial pathogen with resistance to several commonly used antibiotics. Owing to its multidrug resistance (MDR), management of *S. maltophilia* blood stream infection (BSI) is challenging and requires the selection of appropriate antibiotic therapy. The presence of thrombocytopenia and shock are independent risk factors associated with increased mortality in patients with *S. maltophilia* BSI. We describe an unusual case of *S. maltophilia* BSI in a middle-age female complicated by dengue fever. We highlight the importance of early recognition of both dengue and *S. maltophilia* infection in management of such cases.

**Key Words**
*Stenotrophomonas maltophilia;* Dengue fever; Blood stream infection

## Implications for Practice:

**1. What is known about this subject?**
*Stenotrophomonas maltophilia* is a nosocomial pathogen with resistance to several antimicrobial agents. *S. maltophilia* blood stream infection is a potentially life-threatening infection, especially in the presence of thrombocytopenia.

**2. What new information is offered in this case study?**
We describe a case of nosocomial *S. maltophilia* blood stream infection, which co-manifested with dengue fever in a 30-year-old female during the postoperative period.

**3. What are the implications for research, policy, or practice?**
Simultaneous infection with *S. maltophilia* and dengue is a rare condition, the successful outcome of which depends on early diagnosis in a microbiology laboratory.

## Background

*Stenotrophomonas maltophilia* (*S. maltophilia*) is an environmental bacteria isolated from water sources, soil, plant, and food materials.[1] It is a multidrug resistant bacillus implicated in causation of blood stream infections and has emerged as a nosocomial pathogen in recent years.[2,3] It is considered an opportunistic pathogen and the potential risk factors include malignancies, debilitating illness, long hospital stay, prolonged intubation, chronic respiratory diseases, and indwelling vascular catheters.[1,3,4] Infection by this organism usually presents as bacteraemia or as pneumonia, urinary tract infection, soft tissue infections, endocarditis, arthritis, and osteomyelitis.[5] It has caused many outbreaks, is nearly 80 per cent of nosocomial origin, and is intrinsically resistant to most of the antibiotics used for treating hospital-acquired infections, and thereby poses a challenge to clinicians.[5–7]

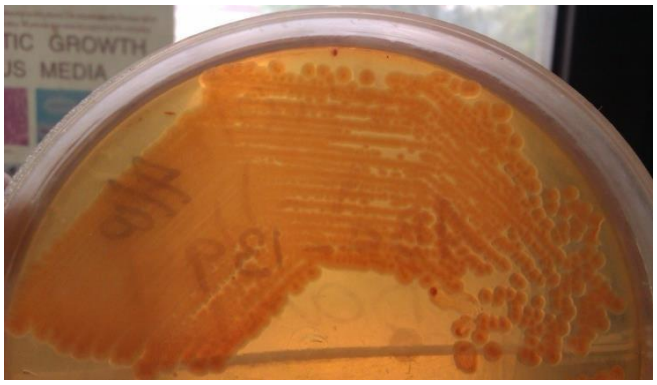
## Case details

A 30-year-old female presented to the surgery outpatient clinic complaining of swelling in the front of her neck for the

previous two years with a history of weight gain, lethargy, and spontaneous abortion one month previous. She was provisionally diagnosed to have multi-nodular goitre in euthyroid state, which was confirmed by ultrasound neck and thyroid function tests, for which she underwent total thyroidectomy.

On the first postoperative day, an intravenous line was established for administering drugs and she was given a stat dose of Ceftriaxone 1gm. On the fourth postoperative day, the patient developed high-grade fever (39.4$^{O}$C) with chills. The operated area was clean. Blood culture was sent for examination and oral Cefixime 200mg twice daily was started empirically. Blood culture was positive after 48 hours of incubation in BD BACTEC FX system (Becton Dickinson, USA). Thin, gram-negative, motile, bacilli producing, non-haemolytic grey moist colonies on blood agar and non-lactose fermenting colonies on MacConkey agar were isolated (Figure 1) and subjected to biochemical identification tests. The isolate was negative for oxidase, indole production, methyl red test, Voges Proskauer test, citrate utilisation, urease production, and mannitol fermentation. It reduced nitrate to nitrite, fermented only maltose oxidatively, and decarboxylated lysine. It was biochemically identified as *Stenotrophomonas maltophilia*. Antibiotic susceptibility testing was done by Kirby-Bauer disc diffusion test as per Clinical and Laboratory Standards Institute (CLSI) guidelines.[8] The isolate was resistant to Levofloxacin, Minofloxacin, Ceftriaxone, and sensitive only to Co-trimoxazole.

**Figure 1: Non-lactose fermenting colonies of *S. maltophilia* on MacConkey agar**



Accordingly, Co-trimoxazole was started on the seventh postoperative day, after receiving the antibiogram report. The fever subsided but reappeared along with headache in another day despite antibiotics, which led to further investigations to identify the cause. Her haemogram showed haemoglobin 13gm per cent, total leucocyte count of 10,600/cubic mm, differential count–neutrophils 84 per cent, lymphocytes 15 per cent, and eosinophils 1 per cent, blood urea 15mg/dl, serum creatinine 0.9mg/dl, and random blood sugar 109mg/dl. Urine for culture was sterile. Peripheral blood smear examination was negative for malarial or filarial parasites. Dengue-NS1 antigen was found reactive by SD Dengue Duo (SD BIOLINE, India). The initial platelet count was 2.78 lakhs/cubic mm. Serial platelet counts were estimated periodically to look for thrombocytopenia. The platelet counts did not drop considerably. Dengue was managed conservatively with symptomatic treatment. A probable source of infection for *S. maltophilia* could have been the suction apparatus or the indwelling venous catheter. An attempt to identify the source was unsuccessful. The patient recovered from these symptoms and was discharged on the 15$^{th}$ postoperative day.

## Discussion

Nosocomial bacteraemia due to *S. maltophilia* has a significant morbidity and mortality with an increased incidence in the intensive care setup.[9] It is ubiquitous in nature and has been isolated from various sources like soil, water, and sewage. Tap water, contaminated deionised water, central venous catheters, reusable capillary dialysers, ventilator tubing, suction equipment, nebulisers, and spirometers have been reported as nosocomial reservoirs.[7–9] It causes a wide spectrum of infections and infects patients with weaker immune function.[9] Several studies reported that malignancy, chronic respiratory disease, prior antibiotic therapy, prolonged hospital (as in this case) or ICU stay were significant risk factors for *S. maltophilia* infection.[1,3] Indwelling vascular devices related *S. maltophilia* infections could be as high as 40 per cent and the physician should have a high index of suspicion.[5]

Mortality of *S. maltophilia* BSI ranges from 14–69 per cent.[10] Old age, total parenteral nutrition, low creatinine clearance, anemia, thrombocytopenia, organ failure, and shock were identified as major factors significantly associated with mortality in *S. maltophilia* BSI in different studies.[10,11] Though *S*. maltophilia causes infections in predominantly nosocomial settings, community-acquired infections are occasionally reported.

A review by Falagas et al. identified 77 patients with community-acquired *S. maltophilia* infections.[12] Of these, the majority (n=45, 58.44 per cent) had bacteraemia. The common comorbidities identified were malignancy, prior hospitalisation, and HIV infection. Hence, a family physician may occasionally encounter community-acquired *S.*

*maltophilia* infection in a patient with malignancy or in the postoperative period after discharge.

Though thrombocytopenia and shock are essential features of dengue infection and presence of dengue is a potentially bad prognostic factor, it did not affect the prognosis of the patient in our case. Though the exact cause is unknown, the possible factors could be the well-preserved platelet count. More importantly, this could be due to a primary infection with dengue virus, wherein symptoms could be mild. If this same patient was exposed to a subsequent infection with a new dengue serotype, she could possibly have developed more severe clinical features like dengue haemorrhagic fever or shock. Owing to abundance of the insect vector (*Aedes aegypti*) and collections of stagnant water in and around the locality, frequent outbreaks of dengue are common.

It is very difficult to determine whether dengue originated prior to or following admission. However, it is well known that symptoms of dengue usually last for two to seven days, following an incubation period of four to 10 days after the bite from an infected mosquito. In this case, the patient developed symptoms of fever and headache on the eighth postoperative day, which is well within the usual incubation period of dengue. Even if dengue had originated prior to admission, it could not have been identified earlier as the NS1 antigen, which serves as an early marker of dengue with 71–100 per cent sensitivity and 90–98 per cent specificity, can only be detected as early as the first day post-onset of symptoms and remains positive up to 18$^{th}$ day.[13] The diagnosis of dengue resolved the clinician's diagnostic dilemma, as there was concern about the apparent resistance of *S. maltophilia* to Co-trimoxazole.

Common mechanisms of drug resistance in *S. maltophilia*, as suggested in different studies include the ability of this organism to produce beta-lactamases, active efflux, and expression of an OMP-54 protein. In combination, these factors contribute to the multidrug resistance of this organism, which is usually resistant to tetracyclines, quinolones, and chloramphenicol.[1,9] In other studies antibiotic susceptibility and clinical observation suggested the most effective drugs against this infection were Co-trimoxazole, Levofloxacin, and Ticarcillin clavulanate.[1,5,6,14]

Clinical data suggest Co-trimoxazole as the drug of choice despite emerging resistance, which was comparable to our isolate that was sensitive to Co-trimoxazole, Piperacillin tazobactam, and Gentamicin.[1,9,14] Other combinations such as Ceftazidime or Ceftriaxone, Ciprofloxacin alone or in combination with other antibiotics can be used as an alternative to Co-trimoxazole.[14]

In general, the main strategies to prevent *S. maltophilia* infection include avoidance of inappropriate antibiotic use and avoidance of prolonged retention of foreign devices. It is important to maintain and, where appropriate, disinfect or sterilise respiratory therapy equipment, cardiopulmonary bypass apparatus, and hemodialysers. During nosocomial epidemics of *S. maltophilia* infection, reinforcement of hand hygiene practices and wearing of gloves when handling contaminated respiratory secretions and wound drainage are beneficial.[15]

## Conclusion

*S. maltophilia* is an emerging nosocomial pathogen. A high index of suspicion for common infections like dengue is needed in a hospitalised patient who develops a secondary infection or appears unresponsive to effective treatment of the primary infection. This is particularly important in endemic tropical country settings. Admission to an ICU hospital for a blood stream infection does not ensure protection from common vector-borne diseases like dengue, which is an important consideration in diagnosis and management of this disease.

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## PEER REVIEW

Not commissioned. Externally peer reviewed.

## CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

## PATIENT CONSENT

The authors, Sreenivasan S, Kali A, and Vijayan S, declare that:

1. They have obtained written, informed consent for the publication of the details relating to the patient(s) in this report.
2. All possible steps have been taken to safeguard the identity of the patient(s).
3. This submission is compliant with the requirements of local research ethics committees.