Case Report

Stenotrophomonas Maltophila : A Rare Cause of Bacteremia in a Patient of Viral Encephalitis

Shreekant Tiwari[1], Monalisah Nanda[2]

Stenotrophomonas maltophila is an important Nosocomial Bacterial Pathogen. It is ubiquitous, non-fermentative gram negative bacillus previously known as *Pseudomonas maltophila* or *Xanthomonas maltophila*. It is usually of low virulence but now a day there is increased frequency of its isolation from hospitalized patients, especially patient with immunocompromised status. *S maltophila* infections include Bacteremia, Pneumonia, Urinary tract infection, Endocarditis, Meningitis, Peritonitis, Ocular infections, Septic arthritis & Cystic fibrosis. Treatment of *S. maltophila* infection is often difficult as it is resistant to commonly used antimicrobial agents and this antimicrobial resistance may emerge during therapy. Herewith we are reporting a case of bacteremia in a patient with viral encephalitis caused by Dengue Virus. Patient was treated successfully with Co-trimoxazole plus ticarcillin+clavulanic acid along with other supportive measures. [*J Indian Med Assoc* 2022; **120(2):** 54-6]

***Key words* : *Stenotrophomonas maltophila*, Multidrug resistance, Bacteremia, Viral encephalitis.**

Stenotrophomonas maltophila (S maltophila) is an important nosocomial and emerging pathogen. Earlier it was described mainly as opportunistic pathogen in immunocompromised patients but recently it is considered as true pathogen in immunocompetant individual also[1]. *Stenotrophomonas maltophila* was previously called as *Pseudomonas maltophila* or *Xanthomonas maltophila*. It is a Multi Drug Resistant, aerobic, glucose non-fermenting, non- sporing, non acid fast gram negative bacilli distributed widely in the natural and hospital environment. Earlier this pathogen was considered to have low pathogenic potential but now considered as an important nosocomial, multidrug resistant pathogen, because of decreased immunity in general population. It ranks third most common pathogenic non fermenting gram negative bacilli responsible for nosocomial infection after *Pseudomonas aeruginosa & Acinetobacter species.* Recently *Burkholderia Cepacia Complex (BCC)* also considered as an important nosocomial non fermenting gram negative pathogen[2].

Now-a-days it is found that *S maltophila* associated with nosocomial infections. Few of them are blood stream infections, others involve the urinary tract , bone joint, heart meninges, respiratory tract, skin and eye[3]. In cystic Fibrosis patients, *S maltophila* can account for colonization and chronic infection. There are various predisposing factors for *S maltophila* infection. Amongst these few important are malignancies, prolonged stay in Intensive Care Units, use of broad spectrum antibiotics, cytotoxic therapy, patients receiving transplants, damage of mucocutaneous barriers, indwelling urinary catheters and neutropenic patients. The correct identification of *S maltophila* has a great significance because it has to be differentiated from other non fermentative gram negative bacilli. *S maltophila* can be differentiated from other bacterial pathogen present in mixed infection by their ability to ferment certain selective sugars. *S maltophila* produces acid from Maltose but not from Glucose, whereas *Pseudomonas aeruginosa* utilizes Glucose but not Maltose. It is very difficult to identify *S maltophila* routinely in Microbiology Laboratory because of its inert bio-chemical reactions and difficulty in interpretation of phenotypic characteristics. That's why, *S maltophila* infections are less commonly reported from India though its incidence is increasing in Clinical Practice. Treatment of *S maltophila* is very difficult for multiresistance , ability to form biofilm and various extracellular enzymes[4]. Herewith we are reporting a rare case of bacteremia caused by *Stenotrophomonas maltophila* from a patient with viral Encephalitis.

Editor's Comment :

- Automated identification system (Vitek-2) can help in identification and antimicrobial susceptibility testing of such isolates.
- Isolation of *S maltophila* from any clinical samples should be looked with clinical suspicion.

Case Reports

A 35-year-old female from Rural area admitted to our hospital with chief complains of high grade fever (102°F), headache and fast breathing since last 4 days. On examination respiratory rate 46/min, pulse rate 104/min and blood pressure was 128/80 mm Hg. Abdominal examination and Cardiovascular System were within normal limits. Patient was slightly irritable, semi-conscious and there was neck rigidity. Other Central Nervous System findings were within normal range. Relevant laboratory findings include; Haemoglobin 12.2

[1]MD (Microbiology), Professor & Head, Department of Microbiology, Hi-Tech Medical College and Hospital, Bhubaneswar 751025 and Corresponding Author

[2]MD, Associate Professor, Department of Skin and VD, SCB Medical College and Hospital, Cuttack 753007

Received on : 19/11/2020
Accepted on : 01/01/2021

gm%, total White Blood Cell (WBC) count 29400/cmm, Neutrophil 88%, Eosinophil 2%, Lymphocyte 10%, Erythrocyte Sedimentation Rate (ESR) 56 mm after first hour, Na+ 140 m.mol/L, K+ 4.2 m.mol/L, Serum Urea 35 mg/dl, Serum Creatinine 1 mg/dl, Serum Protein 7.5 mg/dl, Serum Albumin 3.8 mg/dl. Routine microscopy of the urine showed pus cells 0-1/hpf, albumin trace and no parasite. Serological tests like Widal Test –negative, ICT for Malaria Parasite-negative, HIV, HBsAg & HCV – negative, Dengue NS1 Ag- reactive, Dengue IgM & IgG antibodies – non reactive, CSF sugar 10 mg/dl, protein - 250 mg/dl, chloride -97 mEq/L, ADA -3.8 U/L, Prothrombin Time (PT) – 12.2 sec, APTT – 33 sec, total platelet count – 1.2 lakhs/cmm, CSF total cell count -550/dl, N -90%, L -10%, RBC – occasional. Liver Function Test (LFT): direct serum bilirubin – 0.2 mg/dl, total serum bilirubin 1 mg/dl, serum alkaline phosphate 539 IU/L, SGOT - 294 IU/L, SGPT – 206 IU/L. Chest X-ray and USG abdomen were normal. With complete aseptic precaution blood and Cerebrospinal Fluid (CSF) were collected in aerobic & anaerobic blood culture bottle (BacT/ALERT/3D; bioMerieux, Marcy l' Etoile, France). Patient was started empirically with piperacillin +tazobactam & vancomycin. Aerobic culture bottle for blood showed positive sign of growth after 48 hours whereas aerobic culture bottle for CSF showed positive sign of growth after 72 hours. Broth was then sub cultured on 5% Sheep Blood Agar and Mac-conkey Agar from both the aerobic culture bottles. After overnight incubation Mac-conkey Agar of both the samples showed non-lactose fermenting, moist, non pigmented, smooth, tiny colonies with entire margin (Fig 1). Blood agar plate from both the samples also showed similar Colony Morphology and they were non-hemolytic. Gram stain was done from both the culture plates (blood & Mac-conkey Agar) of both the samples and it was gram negative bacilli. It was motile by hanging drop method. Routine Biochemical Tests were done and it was catalase positive, oxidase negative, reduced nitrate to nitrites, utilized glucose oxidatively, Lysine Decarboxylase Test was positive but Orinithine and Arginine test negative. On TSI both slant & butt was alkaline, produced H_2S on lead acetate paper strip. Further identification was done by VITEK-2 compact (fully automated identification system) using gram negative card (bioMerieux, Marcy l'Etoile France). It was identified as *Stenotrophomonas maltophila* with 99% probability from blood sample and with 98% probability from CSF sample. There was no growth on anaerobic culture bottle of both the samples even after 7 days of anaerobic incubation. Urine sample was also sent to the Microbiology department for culture & sensitivity. It was processed on Cysteine Lactose Electrolyte Deficient (CLED) media but there was no growth after 48 hours of aerobic incubation. Isolation of same bacteria from both the clinical samples (Blood &CSF) confirmed its pathogenic role. Antimicrobial susceptibility was performed with the disc diffusion method as described by the CLSI (Clinical and Laboratory Standard Institute) Guidelines and by VITEK -2 AST card. Sensitivity was detected to co-trimoxazole, levofloxacin, ticarcillin+ clavulanic acid, tigecycline, colistin & polymyxin B and resistant to gentamicin, amikacin, piperacillin+ tazobactam, imipenem, meropenem, cefotaxime and ceftazidime. Antibiotic susceptibility profile was same from both the clinical samples. Therapy was changed as per antibiotic susceptibility report to co-trimoxazole and ticarcillin+clavulanic acid for 14 days. There was good antibiotic response and fever was subsided on 4th day after starting the antibiotic therapy. Repeat blood culture was done after completion of therapy (14 days) and it was negative. Patient is doing well during follow up.

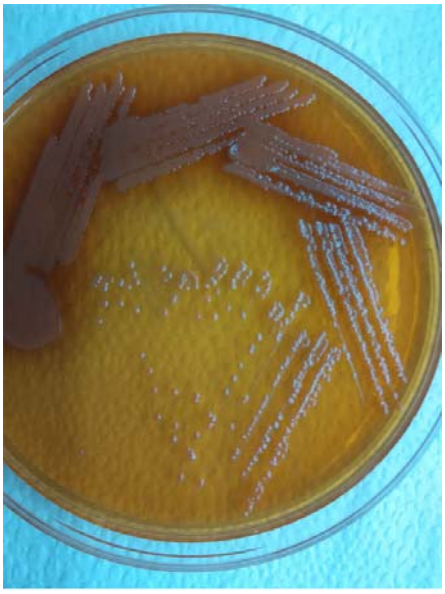

Fig 1 — Non-Lactose fermenting colonies of *S maltophila*

Discussion

Stenotrophomonas maltophila is a multi-drug resistant, nosocomial and an emerging pathogen. It is an aerobic, non-fermenting, non-sporing, gram negative bacillus. Primarily this organism is a plant pathogen which was also isolated from soil and water. Though initially it was considered as a pathogen of low virulence, but now it has been increasingly reported as nosocomial pathogen responsible for serious complications in immunocompromised as well as in immunocompetant hosts also. *S maltophila* was first isolated in 1943 by JL Edward and named *as 'Bacterium bookeri'*. It was named as pseudomonas maltophila in 1958 by Hugh and Ryschenkow. In 1981, *Pseudomonas maltophila* was re-classified as *Xanthomonas maltophila*. Finally Palleroni & Braudbury put it in genus *Stenotrophomonas* with only one species *S maltophila* in 1993[4]. Currently genus *Stenotrophomonas* consist of 12 recognized species. In 1997, Spirostachys Africana recognized as a new species, which was later found to be similar to *S maltophila*. It is ubiquitous in nature and due to this nature of *S maltophila*, many fomites and medical equipments in clinical settings may serve as reservoirs of infections. The most common risk factors for *S maltophila* infections are prolonged stay in ICU, indwelling urinary catheters, mechanical ventilation, prolonged use of broad spectrum antibiotics, corticosteroid therapy, cystic fibrosis, underlying malignancies, HIV infection and transplant recipients[5].

The most frequently reported infections caused by *S maltophila* include pneumonia, Blood Stream Infection (BSI), wound infection and Urinary Tract Infections, Ocular

infections, Endocarditis. Other less common infections are Meningitis, Sepsis, Skin and soft tissue infections, Epididymitis, Arthritis, Sinusitis, Cholangitis, Pyomyositis, Peritonitis and Osteoarthritis. There are few documented reports on community acquired *S maltophila* infections which most commonly occurs in patients with pre-existing co-morbidities[6]. Blood isolates of *S maltophila* should be properly analyzed to differentiate between true blood stream infection, contamination or colonisation. Commonest source of blood stream infection by *S maltophila* is central venous line. A previous surveillance study reported that *S maltophila* was the third most frequently isolated non-fermenting, gram negative bacillus after *pseudomonas aeruginosa and acinetobacter species*. Therefore clinicians must be aware that *S. maltophila* may spread anywhere in the hospital environment, especially from water related sources and medical equipments used for patient care[7].

Treatment for *S maltophila* infections is challenging due to multiresistance. These pathogens are intrinsically resistant to aminoglycosides and carbapenems. The possible mechanisms of antimicrobial resistance in *S maltophila* include; efflux pump, low outer membrane permeability, antibiotic inactivating enzymes and â lactamases. In literature, limited data are available on clinical trials, of various treatment regimes. In routine Microbiology Laboratory antimicrobial susceptibility among *S maltophila* isolates should be done by Kirby-Bauer disc diffusion method against co-trimoxazole, minocycline and levofloxacin as per Clinical Laboratory Standard Institute (CLSI) guidelines. As per CLSI guideline only Minimum Inhibitory concentration (MIC) is determined against ticarcillin-clavulanic acid, ceftazidime, minocycline, levofloxacine, co-trimoxazole and chloramphenicol[8]. Co-trimoxazole is the drug of choice for the treatment of S *maltophila* infections due to its good susceptibility and clinical outcomes in the treated patients. Co-trimoxazole was also sensitive in our case and patient recovered very well after treatment. The scenario is now changing and there are now few reports for emerging resistance to co-trimoxazole throughout the world. Ticarcillin-clavulanic acid has been prescribed as the second drug of choice due to its in-vitro activity against *S maltophila* infections in co-trimoxazole resistant cases.

In recent years, reports of high susceptibility rate of *S. maltophila* against colistin and polymyxin B are available. In our case both colistin and polymyxin B was sensitive by disc diffusion method however patient was treated successfully by co-trimoxazole and levofloxacin which were other sensitive antibiotics in panel. In case where co-trimoxazole is resistant, combination of two or more antimicrobial agents might prove benefits but there is the lack of clinical data about combination therapy and also more research have to be done. It has been suggested that combination therapy have better bactericidal kinetics than monotherapy. Early prosthetic-aortic valve Endocarditis and osteomyelitis were successfully treated by combination therapy[9]. Combined antibiotic therapy for bacteremia caused by *S. maltophila* is based on synergistic effect of co-trimoxazole plus ceftazidime, co-trimoxazole plus ticarcillin-clavulanic acid and ticarcillin-clavulanic acid plus ciprofloxacin[10]. Recent study indicated that fluroquinolones are feasible alternative to Trimethoprim-sulfamethoxazole (TMP-SMX) for the treatment of *S maltophila* bacteremia.

Stenotrophomonas maltophila has very dynamic characteristics. In the last two decades it has risen from environmental organism to grievous opportunistic pathogen. The organism is not only an opportunistic pathogen in immunocompromised hosts but also reported as true pathogen in immunocompetant individuals. *S maltophila* is not only resistant to commonly used antibiotics but also have ability to cause degradation of antibiotics. It uses antibiotics as food, which is of great concern in its role as nosocomial pathogen. Strict adherence to rules of hygiene, quality control in hospital units, avoiding the abuse of antibiotics etc. are suggested; as these things, predispose the organism to antibiotic resistance. To know more about this pathogen, there is need to collect epidemiological data of clinical isolates of *S maltophila*. Hospital should also perform surveillance on *S maltophila* associated infections. Clinical Microbiology Laboratories should do correct identification and reporting of *S maltophila.* Its isolation from clinical samples should be considered significant not be dismissed as commensals always.

References

1 Adegoke AA, Stenstrom TA, Okoh AI — *Stenotrophomonas maltophila* as an emerging ubiquitous pathogen: looking beyond contemporary antibiotic therapy. *Front Microbiol* 2017; **8:** 2276

2 Batra P, Mathur P, Misra MC — Clinical characteristics and prognostic factors of patients with *Stenotrophomonas maltophila* infections. *J Lab Physicians* 2017; **9:** 132-5.

3 LiPuma JJ, Curie BJ, Peacock SJ,Vandamme PAR — *Burkholderia, Stenotrophomonas, Ralstonia, Cupriavidus, Pandoraea, Brevundimonas, Comamonas, Delftia, and Acidovorax*. In: Baron EJ, P faller MA, Jorgensen JH, Yolken RH, editors. Manual of Clinical Microbiology. 8th ed. Washington, DC: *ASM Press* 2010; 692-71.

4 Singhal L, Kaur P, Gautam V — *Stenotrophomonas maltophila*: From trivial to grievous. *Indian J Med Microbiol* 2017; **35:** 469-79.

5 Brooke JS — *Stenotrophomonas maltophila*: An emerging global opportunistic pathogen. *Clin Microbiol Rev* 2012; **25:** 2-41.

6 Falagas ME, Valkimadi PE, Huang YT, Matthaiou DK, Hsueh PR — Therapeutic options for *Stenotrophomonas maltophila* infections beyond co-trimoxazole: A systematic review. *J Antimicrob Chemother* 2008; **62:** 889-94.

7 Sawai T, Yoshioka S, Matsuo N, Suyama N — Intraabdominal abscess caused by *Stenotrophomonas maltophila*: A case report. *International J Surg case reports* 2017; **41:** 212-14.

8 Clinical and Laboratory Standard Institute: Performance standards for antimicrobial susceptibility testing; Twenty-ninth informational supplement. CLSI document M100-S29. Wayne, PA: Clinical and Laboratory Standards Institute;2019.

9 Muder RR — Optimizing therapy for *Stenotrophomonas maltophila. Semin Respir Crit Care Med* 2007; **28:** 672-7.

10 Kataria A, Lata S, Khillan V — Hemodialysis catheter –related bacteremia caused by *Stenotrophomonas maltophila. Indian J Nephrol Sep* 2015; **25(5):** 318-19.