

***Sphingomonas* and *Pneumocystis jirovecii* opportunistic infection in HIV–TB infected child: A case report from Western Maharashtra**

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ABSTRACT: The human immunodeficiency virus (HIV) infection leading to Acquired Immunodeficiency Syndrome (AIDS) causes progressive decline in immunological response in people living with HIV/AIDS making them susceptible to a variety of and opportunistic infections which are responsible for morbidity and mortality. HIV patients are at high risk of opportunistic infection(OI).Among them Tuberculosis is common, *Pneumocystis jirovecii* pneumonia (PJP) is common with low CD4 count. Here we are describing a case of HIV-1 positive patient having low CD4 count. With multiple OI, it include PJP, Pulmonary tuberculosis and secondary bacterial pneumonia with *Sphingomonas paucimobilis*.

KEYWORDS: HIV, *Pneumocystis jirovecii* pneumonia, *Sphingomonas paucimobilis* , Tuberculosis.

INTRODUCTION

HIV/ AIDS is a pandemic disease. The first case of AIDS in India was reported in 1986 and now India is a country with the second largest population of HIV infected individuals [1].

In India, HIV not only in the high-risk groups but it is common among the general population.

This RNA virus, plays a very significant role in weakening the immune system of its host. The CD4+ lymphocytes are to be attacked first, which leads to progressive reduction in the number of CD4 cells. Reduced CD4 count leading to reduced host immunity. When host immunity weakens opportunistic infections come in picture.

OIs are the main reasons for hospitalization and substantial morbidity in HIV infected patients. OIs are bacterial, fungal, parasites. In Bacterial infection are like TB, & many other bacterial infection, in fungal infection *Pneumocystis* pneumonia (PJP),*Candidiasis*, *Cryptococcosis*, *penicillium* species, *Aspergillus* infection are common. Many parasitic infection like cryptosporidium, Toxoplasma infection are common. [2] Among them HIV and TB are common co infection in India.[3]

PJP is caused by *Pneumocystis jirovecii*, classified as a fungus but also shares biologic characteristics with protozoa. This common opportunistic infection in western world. [4]

Sphingomonas paucimobilis is aerobic, gram negative rods, nonfermenter commonly affecting immunocompromised individuals. *Sphingomonas*, a bacterial genus defined in 1990, (includes at least 12 species) of which *Sphingomonas paucimobilis* is considered to be of the highest clinical importance. It is frequently isolated from environmental sources such as soil and water, and it is found on hospital equipment such as ventilators, nebulizers, etc[5]. *paucimobilis* is rarely causes infection in humans. [6,7]

CASE REPORT

A 10 year old HIV-1 positive boy on antitubercular treatment was admitted to Intensive Care Unit, with chief complaint of fever, cough ,dyspnoea since 15 days. Fever was continuous, high grade not relieved by antipyretics. Cough was dry, non-

productive. He was diagnosed as pulmonary tuberculosis 3 months back... Patient was on Anti-Retroviral Therapy (ART) since he was 2 years old. After detailed history mother told that he was not taking ART medication since last 6 months. On X ray PJP was suspected and induced sputum sample was sent for the same. On positive report from microbiology department, patient was treated as PJP. Patient's condition continued to deteriorate, he was put on ventilator. Patient was not improving, on suspicion of secondary bacterial infection endotracheal secretion was sent, which showed growth of *Sphingomonas paucimobilis*. It was sensitive to meropenem.

Despite of all vigorous attempts, patient did not survive.

ON EXAMINATION

He was oriented, febrile, tachypneic and had tachycardia. Patient had respiratory distress with respiratory rate 35 breaths per minute with shallow character. Pallor and oral thrush were present. On auscultation, bronchial breathing, creptation and rhonchi present bilaterally in lower zone. Other systemic examination was normal.

MICROBIOLOGICAL WORK UP

- 1) Blood sample was sent for CD4 count .
- 2) Induced sputum for Giemsa staining.
- 3) Endotracheal secretion for bacterial culture sensitivity.

RESULTS

- 1) Blood sample was sent for CD4 count -11 cells/mm³ by Flowcytometry method.
- 2) Induced sputum for Giemsa staining- revealed pleomorphic trophozoites of size 1-5 µm under oil immersion field suggestive of *P. jirovecii*
- 3) Endotracheal secretion for bacterial culture sensitivity- Yellow coloured smooth colonies as shown in figure (a) were present on blood agar plate after 18 hours incubation, no growth on MacConkey agar.

Colonies were catalase positive, oxidase positive, gram negative, non sporing, nonmotile rods.

Identified as *Sphingomonas paucimobilis* on detailed biochemical test as shown in table 1. [koneman]

Table No-1-Biochemical characteristics of *S.paucimobilis*

Biochemical reaction	Results
Indole	Not produced
Methyl red	Negative
Voges proskauer	Negative
Citrate	Not utilised
Urease	Not reduced
Triple sugar iron	Alkali/no change
Bile esculine	Hydrolysed
DNase	Hydrolysed
ONPG	Positive
OF Glucose	Utilised
OF Xylose	Utilised
OF Maltose	Utilised
OF mannitol	Utilised
Growth on MacConkey	No growth
Nitrate reduction	Not reduced



Figure a-Yellow pigmented colonies of *Sphingomonas paucimobilis* on Nutrient agar.

ANTIMICROBIAL SUSCEPTIBILITY TESTING

It is done on Mueller Hinton agar by Kirby bauer disc diffusion method .[CLSI]

It was resistant to amikacin,ciprofloxacin,ampicillin,cefotaxim,cotrimoxazole ,cefotaxim-clavulonic acid. It was sensitive to meropenem.

OTHER INVESTIGATION

1) X-ray chest- showed prominent bronchovascular marking with bilateral interstitial pneumonia in lower and middle zone.

Other investigation-Reports of other investigation as shown in table no 2.

Table no 2-Reports of other investigation of the patient.

Test	Results
Blood sugar level	92mg%
Blood urea nitrogen level	26 mmol/lit
Serum creatinine	0.7 mg/dl
Serum sodium	135 mEq/lit
Serum Pottasium	3.0 mEq/lit
Complete CBC Count	
Haemoglobin	7.1 gm%
WBC	5000 /mm ³
Lymphocyte	19 %
Monocyte	2%
<i>Neutrophil</i>	79%
Platelet count	4,20000/μl
ESR	25 mm/hour

TREATMENT HISTORY

On admission patient was administered amikacin and levofloxacin for 5 days.After the Microbiological report patient was put on Trimethoprim-Sulphamethaxazole with dose of 15 mg/kg/day. Meropenem was added to regimen on antimicrobial sensitivity testing report for *Sphingomonas paucimobilis* .

DISCUSSION

TB affects adults more than children. At present, worldwide over one million children are infected with tuberculosis (TB) and 630,000 by HIV annually.[8] In patients HIV- TB co-infection immunity rapidly downgrade. TB infection increases viral load six to seven fold in HIV patients. This leads to high mortality rate [10] In this co-infection, pulmonary TB is most common

presentation. It is present in about 75% of all HIV infected patients with TB. [9] In our case patient was on ART since 2 years of age, he was not taking medication since six months. This could possibly be the reason of patient developing tuberculosis.

P.jerovecii pneumonia (PJP), it is the commonest infection in the Western world.[4]

Very few Indian studies have reported PJP in HIV. The reported incidence of PJP is about 4% of opportunistic infections in HIV patients and three cases have been reported from Delhi. [13] Similar co-infection is found in 10 patients from Andrapradesh in [N. Usha Rani et al study and about 0.8% patients from Iran[18] This probably could be explained by the extensive use of cotrimoxazole in the prophylaxis of PJP in HIV.[14,15] In India, the incidence of HIV infection is rapidly increasing in recent years, but very few case reports available in Indian literature. [16]

PJP predominantly occurs in individuals with previously undiagnosed HIV disease or those not currently receiving HIV care [17] 90% of PJP cases occurred in patient with CD4 count <200 cell/mm³. Risk factors for PJP are CD4 count <14%, previous episodes of PCP, oral thrush, recurrent bacterial pneumonia, unintentional weight loss, and higher plasma HIV RNA levels.[19]

The low CD4 count and discontinued ART for long, might explain the probable cause of PJP in our patient.

The Centre for Disease Control/Communicable Disease Surveillance Centre (CDC/ CDSC) criteria allow presumptive diagnosis of PCP in HIV seropositive presenting with (i) dyspnoea on exertion / non-productive cough of recent onset, (ii) chest X-ray showing diffuse bilateral interstitial infiltrates, (iii) arterial hypoxemia and (iv) no evidence of bacterial pneumonia.[20] 50-90% of patients of PJP presents with the development of diffuse, bilateral interstitial or alveolar infiltrates as most common X-ray finding. [21-23] Lobar or segmental consolidation, solitary pulmonary nodule with or without cavitation, these are some atypical X-ray findings in PCP. [24,25] The X-ray findings we got in our patient was typical of PJP.

For diagnosis of PJP, samples like induced sputum, bronchoalveolar lavage, biopsy material are used. Selective staining methods like Silver methamine, Giemsa, Toluidine blue are used routinely, for biopsy material Papanicolaou is used. In all staining techniques Immunofluorescence staining using monoclonal antibodies is most accurate technique and used in most of the study.

DNA amplification technique, PCR are most sensitive molecular techniques used for diagnosis of PJP. In our setting, due to unavailability of molecular technique, we used Giemsa staining for diagnosis. This is easily available and 80% sensitive in positive cases. [21,16]

Second bacterial opportunistic infection in our patient after TB is *Sphingomonas paucimobilis*. *S. paucimobilis* infection generally occurs with malignancy, immunosuppressant therapy, diabetes mellitus and acquired immunodeficiency syndrome. Our patient is immunocompromised and stayed long in hospital, this might be the reason behind development of nosocomial infection by this organism. [9] It is responsible for two types of human infections: community-acquired infection and nosocomial infection. [7] Although human infections caused by *S. paucimobilis* are generally rare, these infections appear to have increased in humans in recent years. [26]

The strains of *S. paucimobilis* are usually resistant to penicillins and first generation cephalosporins due to the production of chromosomally encoded beta-lactamase production. [27] Previous reports suggested that third generation cephalosporins or aminoglycosides were best choice of treatment of *S. paucimobilis* infections. Other study showed that Imipenem alone or an aminoglycoside plus a third-generation cephalosporin could effectively treat infections. There are no definitive guidelines exist for the treatment of this organism. [5,28]

The *S. paucimobilis* isolates in this study exhibited different antibiotic susceptibility trends from those in other studies. It is sensitive to meropenem. This changing trend may be due to the liberal and empirical use of antibiotics. Non fermentative gram negative bacilli have emerged as important health care-associated pathogens.

CONCLUSION

This case once again highlights the importance of compliance in ART & the fatal consequences it can lead to if the treatment is not taken regularly. HIV is a dreadful disease and can land up a patient in a bunch of OIs. Hence early diagnosis and treatment of OIs may improve survival and reduce the risk of transmitting the infection to others.

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