Journal of Tuberculosis Research, 2015, 3, 54-58
Published Online June 2015 in SciRes. http://www.scirp.org/journal/jtr
http://dx.doi.org/10.4236/jtr.2015.32008

A Case of Meningitis Caused by *Mycobacterium abscessus* in a Paediatric Patient

D. R. Gayathri Devi[1], H. B. Mallikarjuna[2], Anusha Chaturvedi[1], S. Vishnu Prasad[3]

[1]Department of Microbiology, M. S. Ramaiah Medical College, Bangalore, India
[2]Department of Pediatrics, M. S. Ramaiah Medical College, Bangalore, India
[3]Department of Microbiology, Centre for Basic Sciences, Kasturba Medical College, Manipal University, Manipal, India
Email: anusha_chaturvedi@yahoo.co.in

Received 15 April 2015; accepted 26 June 2015; published 30 June 2015

Abstract

***Mycobacterium abscessus*, a rapidly growing and potentially pathogenic Mycobacterium, is an environmental contaminant and is commonly found in tap water supplies. We report a case of *M. abscessus* meningitis following VP shunt insertion. A 9-year-old male patient with previous history of aqueductal stenosis and hydrocephalus with VP shunt *in situ*, presented with pain abdomen of 10 days duration. Investigations revealed multiple mesenteric lymph nodes with impacted VP shunt tip within the omentum. Ascitic fluid and CSF tap showed Acid-Fast Bacilli, later confirmed to be *M. abscessus*. The patient was treated with Clarithromycin and Amikacin, leading to resolution of the infection. To the best of our knowledge, this is the first reported case of *M. abscessus* meningitis in an immunocompetent individual. We discuss the possible sources of infection and therapeutic challenges. It is of utmost importance to consider, with high index of suspicion, non-tubercular Mycobacteria as the causative organism in patients, who do not respond to regular anti-tubercular regimen.**

Keywords

Ventriculo-Peritoneal (VP) Shunt, Non-Tubercular Myobacteria (NTM), Peritonitis, Meningitis

1. Introduction

Mycobacterium abscessus, formerly *Mycobacterium chelonae* subspecies *abscessus*, is a distant relative of My-

How to cite this paper: Devi, D.R.G., Mallikarjuna, H.B., Chaturvedi, A. and Prasad, S.V. (2015) A Case of Meningitis Caused by *Mycobacterium abscessus* in a Paediatric Patient. *Journal of Tuberculosis Research*, **3**, 54-58.
http://dx.doi.org/10.4236/jtr.2015.32008

cobacteria. This organism constitutes Group IV, *i.e*. Rapid Growers of Runyon's Classification of Non Tubercular Mycobacteria (NTM) [1].

M. abscessus is an environmental pathogen, found in soil, water and dust [2]. It is capable of contaminating water supplies, reagents and water solutions in hospitals and has the ability to survive in nutritionally deficient environments over a wide range of temperature [3].

M. abscessus is known to cause nosocomial infections, most commonly skin and soft-tissue abscess, secondary to trauma or injection with contaminated syringes, others being surgical wound infections, pulmonary infections, endocarditis, peritonitis and disseminated infection in patients on haemodialysis and in immunocompromised individuals [3] [4]. CNS infection due to *M. abscessus* is very rare and when present, is secondary to pulmonary infection [5].

We report a case of isolated tubercular meningitis due to *Mycobacterium abscessus* and the dissemination to the peritoneal cavity via a Ventriculo-Peritoneal (VP) shunt.

2. Case Report

A 9-year-old male boy was referred to our hospital with complaints of fever, pain abdomen and vomiting of 10 days duration, associated with cerebellar signs and papilledema. The investigations performed at the referring hospital included ultrasonography (USG) of the abdomen, which showed gross ascites with mild hepatomegaly and ascitic fluid analysis revealed raised cell counts (PMN cells-2500/cu.mm). Computed tomography (CT) of the abdomen revealed multiple mesenteric lymph nodes with omental thickening with the distal end of the VP shunt impacted in the thickening. CT brain showed hydrocephalus (**Figure 1**). The diagnosis of TB peritonitis was made at the referring hospital and the patient started on anti-tubercular treatment (Isoniazid: 5.0 mg/kg, Rifampicin: 10.0 mg/kg, Pyrazinamide: 30.0 mg/kg, Ethambutol: 20.0 mg/kg) and referred to our hospital for further management.

The patient was previously admitted to a tertiary care hospital with the symptoms of involuntary movements of the upper limbs and change in gait, which progressed over a period of 2 months. Associated complaints of loss of bladder control and headache were also present. Radiological investigations revealed aqueductal stenosis leading to hydrocephalus. Surgery for right sided VP shunt insertion was performed.

Following admission to our hospital, CT abdomen was repeated, which showed features suggestive of exudative ascites. The patient was taken up for surgery in view of blocked VP shunt and peritonitis, and laparotomy with peritoneal lavage with omentectomy was performed and the VP shunt was replaced. The histopathological examination of the omentum revealed granulomatous inflammation, suggestive of tuberculosis and features of superadded acute infection. Gram's stain of the sample showed occasional WBCs and no organisms and Ziehl Neelsen (ZN) stain showed the presence of Acid Fast Bacilli (AFB). There was no growth on aerobic culture, but Lowenstein-Jensen (LJ) medium showed growth after 2 weeks. ZN stain of the growth revealed Acid Fast Bacilli. MPT-64 antigen testing by TB MPT64 Rapid Kit (Standard Diagnostics, Korea) was performed, which gave positive result for the presence of Mycobacteria Other Than Tuberculosis (MOTT). In the 2nd week patient took discharge against medical advice.

10 weeks after discontinuing the hospital care, the patient presented with altered sensorium and drowsiness for a day, associated with lack of response to verbal commands. USG abdomen showed loculated collection in the hypogastric region with the tip of VP shunt located within the collection (**Figure 2**). CT brain was performed, which suggested obstructive hydrocephalus with VP shunt *in situ*. Surgery was performed for exteriorisation of the VP shunt.

Lumbar puncture was done and CSF sent for analysis, Gram's stain showed occasional WBCs and no organisms, while ZN stain was positive for Acid Fast Bacilli (**Figure 3**). Aerobic culture yielded no growth. Growth was seen on LJ medium on the 5th day of inoculation. MPT-64 antigen test was performed from the growth, which gave positive result for the presence MOTT. CSF culture was repeated twice with the same findings.

The isolate was confirmed as *Mycobacterium abscessus*, by GenoType Mycobacterium CM Kit (Hain Lifesciece Gmbh, Germany). *In-vitro* antibiotic sensitivity testing was done using BD BACTEC MGIT 960 System (BD Diagnostics), with the isolate showing resistance to Streptomycin, Isonaizid, Ethambutol, Pyrazinamide and sensitive to Rifampicin among all First-Line drugs, and resistance to all Second-Line drugs: Ofloxacin, Kanamycin, Ethionamide and Amikacin.

After 6 weeks of admission, the patient was started on Clarithromycin (oral) 250 mg 12th hourly (7.5 mg/kg

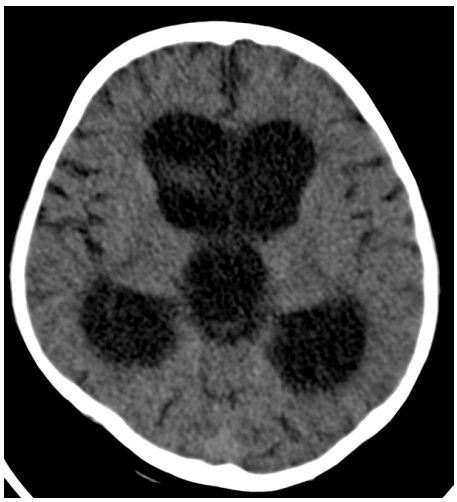

Figure 1. CT brain showing hydrocephalus with enlarged ventricles.

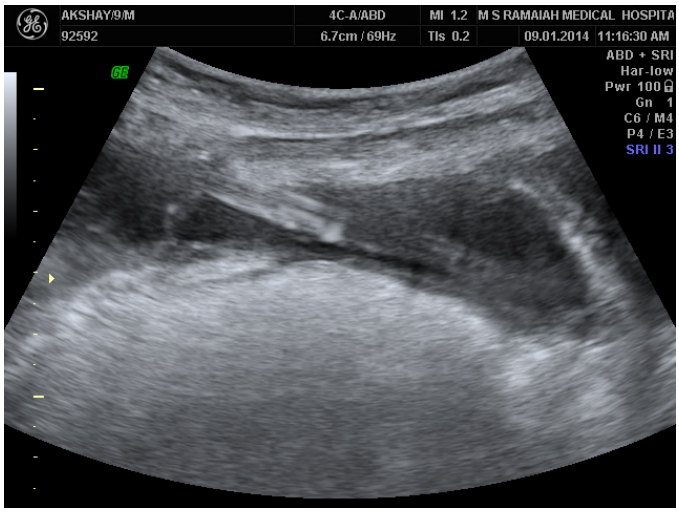

Figure 2. USG abdomen showed loculated collection in the hypogastricregion with the tip of VP shunt located within the collection.

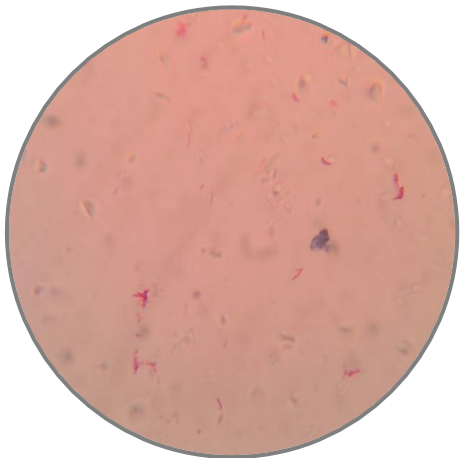

Figure 3. Ziehl-Neelsen stain of CSF showing presence of acid fast bacilli.

orally twice a day) and Amikacin (i.v) 15 mg/kg 12th hourly.

He responded well. And after 1 week on treatment the repeat CSF analysis showed no Acid Fast Bacilli on ZN staining with no growth on LJ medium. Second repeat CSF analysis showed status quo.

The patient was discharged and on regular follow up has shown improvement.

3. Discussion

Mycobacterium abscessus, a NTM, was identified for the first time by Moore and Freichs in 1953. It is known to cause skin and soft tissue infections, from environmental sources or nosocomially, as a result of medical intervention [1]. It has rarely been associated with disseminated infections [6] [7].

Non-Tuberculous Mycobacteria are ubiquitous in nature, and have been isolated from water sources, *M. abscessus* has been isolated from hospital water supplies, surgical and endoscopic equipments [7]. These also produce biofilms in water pipes and the shedding of these biofilms may cause infections in hospitalised patients [3].

Nosocomial infections due to *M. abscessus* are found to be common in renal transplant patients, who are on haemodialysis due to contaminated water [8].

In immunocompetent individuals, *M. abscessus* causes soft tissue infection, especially following penetrating trauma, due to injections and i.v catheterisation [9]. Pulmonary infection due to *M. abscessus* is usually associated with structural lung anomalies [10]. Disseminated infection is rare and is usually seen in immunocompromised individuals. CNS localisation is very rare and is seen secondary to pulmonary disease [5].

A clinical study on 115 cases infected with Rapidly Growing Mycobacteria showed *M. abscessus* to be the commonest NTM in 43 out of 113 (38.05%) cases and was most commonly isolated from the respiratory tract, 32/43 cases (74%); other sites being bloodstream, tissues and ascitic fluid, which made up the rest of the samples [11]. Due to intrinsic resistance to all the first line Anti-Tubercular drugs, *M. abscessus* infection is difficult to treat. According to *in-vitro* studies, *M. abscessus* was found to be susceptible to Clarithromycin, Amikacin, Cefoxitin, making them the drugs of choice for treatment, while Imipenem and Clofazimine have been found to be moderately effective [12].

Since 1990s, Clarithromycin is the drug of choice for *M. abscessus* [1] [2]. Combination therapy of Clarithromycin-Amikacin or Clarithromycin-Amikacin-Ethambutol for 4 - 6 months is recommended [13].

This case highlights infection due to *M. abscessus*, which could be acquired environmentally or following VP shunt insertion. Physicians need to consider MOTT as a cause of infection in the presence of biomedical devices. Our case was resistant to all first line drugs. Treatment with Clarithromycin and Amikacin following antibiotic susceptibility testing resulted in resolution of infection.

4. Conclusions

In tuberculosis endemic region, it is necessary to consider MOTT as the cause, especially in extra-pulmonary manifestations. It is necessary to avoid indiscriminate use of anti-tubercular therapy, which may lead to selection of resistant strains of *Mycobacterium tuberculosis*.

Our case could be timely diagnosed and specific treatment was started, leading to successful recovery.

Acknowledgements

The authors acknowledge Dr. Sandeep T., Assistant Professor, Department of Microbiology, M.S. Ramaiah Medical College, Bangalore, India & Elbit Diagnostics, Bangalore for laboratory support and Dr. Subha Ashok, Post-Graduate, Department of Radio-diagnosis, M.S. Ramaiah Medical College, Bangalore, India, for the help in procuring the radiological images.

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