CASE REPORT

Suppurative BCG Lymphadenitis and the Importance of Microbiology Investigations – A Case Report

Fatimahtuz Zahrah Muhamad Damanhuri[1,2], Hasni Mahayidin[2], Thenmalar Kandasamy[1], Adilahtul Bushro Zaini[1], Siti Norbaya Masri[2], Syafinaz Amin Nordin[2]

[1] Department of Pathology, Hospital Sungai Buloh, Jalan Hospital 47000 Sungai Buloh, Selangor
[2] Department of Medical Microbiology and Parasitology, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, 43400 Serdang, Selangor

ABSTRACT

Suppurative BCG lymphadenitis can easily be overlooked, as it mimics other diseases such as tuberculous lymphadenitis. A case of a three-month old female infant who received the BCG vaccination at birth presented with isolated left axillary mass at two months of age. She was initially treated as lymph node abscess but was referred to the hospital due to the increasing size of the swelling. Needle aspiration was done and the microbiology analysis came out positive for acid-fast bacilli. She was planned for syrup isoniazid; however, the management team withheld treatment until they were certain of the identity of the bacteria. The bacteria was confirmed by the molecular method to be *Mycobacterium bovis* BCG strain. The case report highlights the importance of the microbiology investigations for appropriate management in this case.

Keywords: Acid-fast bacilli, BCG lymphadenitis, *Mycobacterium bovis* BCG, Isoniazid

Corresponding Author:
Syafinaz Amin Nordin, MPath
Email: syafinaz@upm.edu.my
Tel: +603-9769 2478

INTRODUCTION

BCG vaccine is a part of tuberculosis preventive measures in developing countries against TB meningitis and disseminated TB in young children and infant. It was first used in humans to prevent tuberculosis introduced by Albert Calmette and Camille Guierin at the Pasture Institute in 1921. The BCG vaccine contains live attenuated strains of the *Mycobacterium bovis*. *M. bovis* is a member of *M. tuberculosis* (MTB) complex and might be mistaken as MTB clinically, but the molecular method can differentiate the two organisms (1). In Malaysia, due to high burden of MTB, BCG vaccination was integrated into the National BCG vaccine program since 1961 by giving a single intradermal injection of 0.05ml Tokyo 172 BCG strain for children less than one-year old at the left deltoid soon after birth (2). The vaccine is proven safe, however, its administration can result in complications such as the suppurative form of BCG lymphadenitis with the reported incidence of 0.01 to 0.24% in infants (3).

CASE REPORT

A three-month-old infant showed signs of swelling over the left axilla area since two months old. She was initially treated as an outpatient for lymph node abscess, where syrup cloxacillin was given for two weeks. The swelling had increased in size despite having completed the course of antibiotics thus was referred to a tertiary hospital. She was born full-term via spontaneous vaginal delivery with a birth weight of 2.6 kg. Routine BCG vaccination was administered on the left shoulder at birth and the BCG mark had healed well with a scar. Examination of the left axilla revealed that the swelling was measured at 5×3 cm, fluctuant and associated with erythematous of the overlying skin. There was no documented temperature or other sources of infection identified. No family history of TB or TB contact was present. She was admitted with the impression of unresolved left axillary lymph node abscess. Non-guided fine needle aspiration was performed on day three of admission. One cc of pus was aspirated and sent for bacterial and mycobacterial culture. There was no bacterial growth from the routine pus culture, but the acid-fast bacilli (AFB) stain was positive. She was initially planned for syrup isoniazid by the paediatric team.

However, following consultation with the paediatric infectious disease team, they acknowledged the identified organism and decided to withhold the treatment until they were certain of the identity of the bacteria.

The BACTEC Mycobacteria Growth Indicator Tube (MGIT) grew *Mycobacterium tuberculosis* complex after two weeks of incubation and antimicrobial sensitivity assay showed resistance to pyrazinamide. The Microbiologist requested further speciation test due to the culture results and the patient clinical presentation. The speciation test for Mycobacteria uses a molecular technique, in which the nucleic acid probe assays further identification the species of MTB complex as *Mycobacterium bovis* BCG strains. This finding confirms the diagnosis of BCG lymphadenitis. The left axillary swelling reduced in sized after needle aspiration was performed. Syrup isoniazid was not given as it was not indicated in this patient.

Other investigations, such as full blood count, renal profile, liver function test, and erythrocyte sedimentation rate (ESR), were normal. Ultrasound of the left axilla showed features of left axillary suppurative lymphadenitis with the presence of a small abscess. She was discharged well without anti-tuberculosis medication after two weeks of hospitalization. Upon follow up, the left axillary swelling had regressed spontaneously after four weeks of needle aspiration.

DISCUSSION

Bacille Calmette-Guérin (BCG) is a World Health Organization (WHO)-approved vaccine for tuberculosis (TB) disease. It consists of live-attenuated strains of *Mycobacterium bovis* that have lost its virulence in human by being specially cultured in an artificial media for years (1). BCG vaccine is safe when administered to immunocompetent persons but may lead to local reactions, such as local abscess and lymphadenitis (1). A study conducted in Tehran among 14,095 children who had received BCG vaccine at birth found that only 1.9% of the children experienced complications involving the lymph node (3).

The diagnosis of suppurative BCG lymphadenitis is made clinically based on a few criteria, such as the presence of an isolated lymph node swelling at the same side of injection of the BCG vaccine, absence of fever or other constitutional symptoms and the onset are usually within two to four months after the vaccination (4), which was consistent with this patient. However, the diagnosis can be challenging, as the presentation of the swelling mimics other diseases, such as tuberculous lymphadenitis and lymph node abscess. Microbiology investigations play an important role to aid the clinician in achieving the correct diagnosis and management. The availability of advanced technology for MTB culture using BACTEC mycobacterium grow indicator tube (MGIT) in smear-positive patient had shortened the turnaround time from six to two weeks, as compared to the conventional Lowenstein-Jensen (LJ) method. Even though BACTEC MGIT gave a fast culture result, unfortunately, MTB complex antigen test is unable to differentiate the species of MTB complex that caused tuberculous lymphadenitis and BCG lymphadenitis.

Further speciation of Mycobacteria using a molecular technique, such as nucleic acid probe assay, is needed to identify the species of MTB complex (*M. tuberculosis, M. bovis, M. africanum, M. microti, M.canetti, M. caprae, and M. pinnipedii*) (1). The identification of *M. bovis* BCG strain confirmed the diagnosis of BCG lymphadenitis in our patient. Accurate clinical details by the clinicians are required for the laboratory personnel to decide on the necessity of speciation test, as the test is costly and only done upon request. The tuberculin skin test is unhelpful in making the diagnosis, as it gives a false-positive result and is unable to differentiate between *M. bovis* and *M.tuberculosis* (1).

BCG lymphadenitis is often difficult to differentiate from tubercular lymphadenitis. Misdiagnosed will cause unnecessary administration of anti-tuberculosis drugs, which has many side effects. Various strategies have been applied in treating BCG lymphadenitis in the past, including giving patient antimycobacterial therapy, such as isoniazid and rifampicin. However, a recent meta-analysis found no benefits of using anti-TB medications for the treatment of BCG lymphadenitis (5) as it can increase adverse events, such as hepatotoxicity, neurotoxicity and hypersensitivity reaction in the infant (1). The primary treatment of suppurative BCG lymphadenitis is by needle aspiration (2). The aspiration is a rapid, safe and cost-effective method with a significantly higher rate of resolution up to 95%, as it removes the causes of suppuration, such as tuberculin antigens, tubercle bacilli, inflammatory mediators, and hydrolytic enzymes. Surgical excision is only needed for cases of failed needle aspiration, which rarely occurs (3).

CONCLUSION

In conclusion, suppurative BCG lymphadenitis can be successfully managed without any complication. Accurate diagnosis supported by clinical and laboratory investigation findings is

essential for proper management of BCG lymphadenitis and the prevention of unnecessary administration of anti-tuberculosis agents.

ACKNOWLEDGEMENT

We would like to thank the Director of General Health Malaysia for permission to publish this case report.

REFERENCES

1. John E. Bennett, Raphael Dolin MJB. Principles and Practice of Infectious Disease. 9 th. Richard J. Whitley, editor. Elsevier Ltd; 2019. 2985–3021 p.
2. Govindarajan KK, Chai FY. BCG adenitis-need for increased awareness. Malaysian J Med Sci. 2011;18(2):66–9.
3. Ghanaie RM, Karimi A, Zahraei SM, Mahmoudi S, Zuber PLF, Shamshiri AR, et al. Complications following Bacille Calmette-Guerin Vaccination in Children under the Age of 18 Months: A Multi-center Study. Int J Pediatr. 2019;7(1):8867–75.
4. Baek SO, Ko HS, Han HH. BCG vaccination-induced suppurative lymphadenitis: four signs to pay attention to. Int Wound J [Internet]. 2017 Dec;14(6):1385–7. Available from: http://doi.wiley.com/10.1111/iwj.12755
5. Giogi Kuchukidze, Ana Kasradze, TamarDolakidze, David Baliashvili, Tsira Merabishvili, Henry M. Blumberg RRK. Increased in Lymphadenitis Cases after Shift in BCG Vaccine strain. Emerg Infect Dis. 2015;21(9):1677–8.