ORIGINAL RESEARCH PAPER

Paediatric Medicine

A RARE CASE OF MENDELIAN SUSCEPTIBILITY TO MYCOBACTERIAL DISEASE (MSMD) - DISSEMINATED BCG ADENITIS

KEY WORDS: Tuberculosis, Immunodeficiency, Paediatrics, Lymphadenopathy, Genetic disorders

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ABSTRACT

Tuberculosis in children remains a significant health issue, especially with the emergence of drug-resistant strains. Mendelian Susceptibility to Mycobacterial Disease (MSMD) is a rare genetic disorder caused by defects in the IL-12/IFN-gamma pathway, increasing susceptibility to mycobacterial infections including BCG. We report a case of a 5-month-old female, born to a third-degree consanguineous couple, who presented with progressive left axillary swelling following BCG vaccination. Examination revealed a large, firm, matted lymph node. Initial investigations showed AFB-positive FNAC, and the child was started on first-line ATT. On follow-up, inguinal lymphadenopathy developed, with CBNAAT showing rifampicin resistance, requiring second-line therapy. A family history of similar illness prompted genetic testing, which revealed a homozygous mutation in exon-9 of the IL-12RB1 gene, confirming MSMD. This case emphasizes the need to suspect MSMD in children with recurrent or disseminated BCG adenitis, particularly with positive family history.

INTRODUCTION

Tuberculosis (TB) continues to be a major public health problem globally, especially in developing countries like India. Pediatric TB constitutes a significant burden, and to reduce its severity, the Bacillus Calmette–Guérin (BCG) vaccine is administered at birth as part of national immunization programs. Although BCG is generally safe, rare complications such as localized or disseminated BCG adenitis may occur, particularly in children with underlying immunodeficiencies.

One such rare disorder is Mendelian Susceptibility to Mycobacterial Disease (MSMD)—a primary immunodeficiency caused by genetic defects affecting the IL-12/IFN-gamma axis, which plays a crucial role in defending against intracellular pathogens like mycobacteria. Children with MSMD are predisposed to infections from attenuated BCG strains, atypical mycobacteria, and Mycobacterium tuberculosis. Mutations in the IL12RB1 gene are among the most common genetic causes of MSMD.

MSMD often presents with persistent or recurrent lymphadenopathy, especially following BCG vaccination, and may progress to disseminated disease. Due to its rarity and nonspecific presentation, MSMD is frequently underdiagnosed or misdiagnosed, particularly in resource-limited settings. A strong family history of similar presentations may offer an important diagnostic clue.

Early diagnosis is critical for initiating appropriate antitubercular therapy, managing drug resistance, and considering advanced treatment options such as recombinant interferon-gamma or hematopoietic stem cell transplantation in severe cases. This case report highlights a rare presentation of disseminated BCG adenitis in a 5-month-old infant, ultimately diagnosed as MSMD, emphasizing the importance of early recognition and genetic screening in atypical TB presentations in children.

Case Study

A 5-month-old female child, 2 nd order by birth, born to a 3rd degree consanguineously married couple, received BCG at birth, and was exclusively breast fed, presented with persistent swelling in the left axilla, which was gradually progressive, with no history of fever or cough, but history of failure to gain weight and there is history of similar complaints in 1 st sibling with axilla swelling noted at 6 months of age, suspected to be BCG adenitis and child was treated with ATT.

On examination a large axillary lymph node on the left side measuring 3x5cm, mobile, firm in consistency, matted, non-tender. BCG scar was present over the left arm there was no sinus or ulceration noted. Per abdomen -no hepatosplenomegaly, Respiratory system - normal and other systems -WNL.

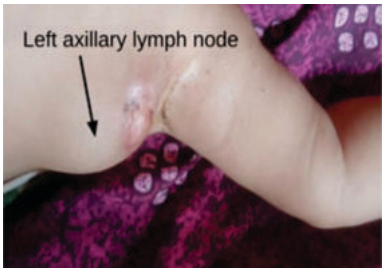

Figure 1: Left Axillary Lymph Node

Investigations revealed CBC - WNL, chest x ray-normal, CBNAAT for gastric aspirate was negative, HRCT – normal, FNAC showed - AFB positive, HIV & HbsAg - non reactive. Child was started on first line ATT. On further follow up, child developed new swelling in the left inguinal region, FNAC done showed CBNAAT positive with isolated resistance to rifampicin. Child was started on 2nd line ATT, (currently ongoing).

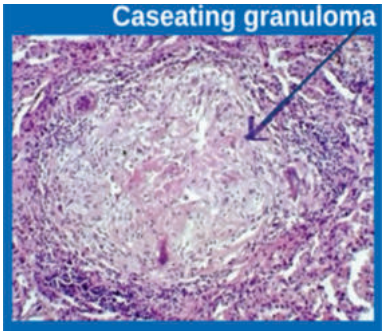

Figure 2: Caseating Granuloma

In view of recurrent lymphadenopathy and previous sibling with BCG adenitis, child was further evaluated for genetic analysis which showed – molecular defect in homozygous variant in exon-9 of IL-12RB1 gene which is diagnostic of MSMD.

Figure 3:Whole Genome Testing

CONCLUSIONS

A 5-month-old female, born to a third-degree consanguineous couple, presented with progressive left axillary swelling following BCG vaccination. She was exclusively breastfed and had no fever or cough but showed poor weight gain. Her sibling had similar symptoms treated as BCG adenitis. Examination revealed a 3×5 cm matted, non-tender lymph node. FNAC was AFB positive; CBNAAT and imaging were normal. She was started on first-line ATT. Later, inguinal lymphadenopathy developed, with CBNAAT showing rifampicin resistance, requiring second-line ATT. Genetic testing confirmed a homozygous IL12RB1 mutation, diagnostic of MSMD. Recurrent BCG adenitis with family history should prompt MSMD evaluation.

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