

BCG Vaccine Induced Tubercular Lymphadenitis in a 5 Month Old Infant - A Case Report

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Abstract: Tuberculosis (TB) remains a major global health concern, particularly in underdeveloped and developing countries. The Bacille Calmette–Guérin (BCG) vaccine, composed of live attenuated *Mycobacterium Bovis*, was first introduced for human use in 1921 to protect against tuberculosis. While the vaccine is considered safe, mild adverse effects such as pain, redness, and swelling at the injection site are relatively common. Less commonly recognized, but potentially more serious, adverse reactions include regional lymphadenitis, BCG-related osteitis, and disseminated BCG infection, particularly in individuals with compromised immune systems. This case report of BCG induced lymphadenitis in a 5-month-old male presented with swelling on left arm near deltoid region and left axillary area from 3 months along with discharging sinus present on neck and fever from 2 months.

Keywords: Tuberculosis, BCG Vaccine, Lymphadenitis.

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I. INTRODUCTION

Tuberculosis (TB) is a communicable disease caused by mycobacterium tuberculosis, continues to be a major global health burden even though it is preventable and treatable.¹ Bacillus Calmette–Guérin (BCG) is a live attenuated vaccine, the only currently available vaccine against TB and has been widely used to reduce the risk of severe forms of the disease, especially in children. As per the National Immunisation Schedule, BCG vaccination is done by intradermal inoculation of 0.05 ml vaccine at left deltoid region. It causes erythematous induration at the site of inoculation, which follows pustule formation after 2-3 weeks; ulceration, drainage, and crusting at 4-6 weeks after vaccination. Healing occurs with small residual scar 10-12 weeks after vaccination.²

BCG lymphadenitis is defined as the enlargement of ipsilateral regional lymph nodes following Bacille Calmette–Guérin (BCG) vaccination. It is broadly classified into non-suppurative and suppurative types. While most cases resolve spontaneously within a few weeks without complications, some may progress to suppuration, characterized by fluctuance, swelling, erythema, and edema of the overlying skin.^{3,4} The development of BCG lymphadenitis is influenced by multiple factors, including the age of the child, the strain of *Mycobacterium Bovis* used in the vaccine, its

immunogenicity, viability, dose, and potency. Prior exposure to mycobacterial antigens may also contribute. Although it typically presents within six months of vaccination, delayed onset up to 24 months can occasionally occur.⁵ Suppurative lymphadenitis is considered one of the more severe complications following BCG vaccination. It occurs in approximately 0.1 to 1 case per 1,000 vaccinated individuals.⁶ Fine needle aspiration cytology (FNAC) is a quick, safe, and cost-effective procedure used for diagnosing and managing BCG lymphadenitis. Cytological examination may reveal necrosis, epithelioid cell granulomas, and inflammatory cells, aiding in diagnosis.

➤ Case Report:



Fig 1 Showing Multiple Swellings on Left Arm Near Deltoid Region and Left Axillary Area

A 5-month-old male infant presented with complaint of multiple swellings on left arm near deltoid region and left axillary area from 3 months which was progressively increasing in size along with discharging sinus present on neck from 2 months. Patient also complaint of low-grade intermittent fever from past 2 months. Fever was not associated with cough, discharge from ears and nose, loss of weight, loose stools and vomiting. No history of hospitalisation in past. No significant antenatal and neonatal history. As per mother and the immunisation record available, patient received BCG vaccination at birth.

On physical examination patient was active, alert and afebrile at the time of examination. Vital signs were within normal limits for age. Pallor as well as cervical and axillary lymphadenopathy was present. No cyanosis, clubbing or edema was noted on examination.

• *Local Examination:*

In Left cervical region, sinus was noted in anterior triangle of neck, underlying matted lymph node mass was palpable measuring 4 x 3 cm, firm in consistency, non-tender, non fluctuant, no local rise of temperature and with restricted mobility. Two swellings were present on left supra and infraclavicular region measuring 2 x 2 cm and 2.5 x 2 cm respectively. Another swelling measuring 2 x 1.5cm noted in axilla. They were soft, mildly fluctuant, non tender with no overlying skin changes and local temperature was not raised.

• *Left Upper Arm (BCG Site):*

Healed BCG scar over the deltoid with adjacent swelling measuring 1.5 x 2 cm is palpable which is firm, non-tender, non-fluctuant with normal overlying skin.

• *Systemic Examination:*

- ✓ Respiratory System: Normal breath sounds, no adventitious sounds.
- ✓ Cardiovascular System: Normal heart sounds, no murmurs.
- ✓ Abdomen: Soft, non-tender, no hepatosplenomegaly.
- ✓ Central Nervous System: Conscious, with normal tone and reflexes for age.

Laboratory investigations showed moderate anaemia with HB 7.7 gm/dl, WBC 8900/mm³. Patient had serum electrolytes, renal function tests and liver function tests within normal range. Chest x ray was also within normal range. Ultrasonography neck and axilla showed multiple enlarged necrotic lymph nodes in bilateral cervical region and left axilla, largest measuring 24 x 15 mm in size on left cervical side. USG whole abdomen was within normal limit. Pus culture shows no growth. Blood culture also shows no growth

Fine needle aspiration cytology showed presence of abundant inflammatory infiltrates composed of lymphocytes, neutrophils and degenerated cells with abundant caseous necrosis. Ziehl- Neelsen staining positive for Acid fast bacilli. The patient was administered antibiotics initially for 6 weeks but showed no improvement. After that as per National

Tuberculosis Elimination Programme (NTEP) in India, full course of ATT was given. Patient showed significant improvement in swellings and constitutional symptoms.

II. DISCUSSION

The BCG vaccine is a live attenuated vaccine prepared from the Mycobacterium Bovis strain. It was first introduced in 1921 and was later incorporated into the World

Health Organization (WHO) immunization program. For its production, the WHO recommends the use of the “Danish 1331” strain.⁷ Globally, around 120 million doses of BCG are administered each year.⁸

In India, the BCG vaccine is included in the National Immunization Program and is administered intradermally at the left deltoid region in newborns.⁹ The vaccine primarily protects infants and young children against disseminated tuberculosis (TB) and tubercular meningitis.^{10,11}

- ✓ Adverse reactions to the BCG vaccine may be mild or severe:
- ✓ Mild reactions: Localized pain, swelling, and redness at the injection site, which are usually self-limiting.
- ✓ Severe reactions: Include suppurative lymphadenitis, osteitis/osteomyelitis, and disseminated BCG infection.

Among these adverse reactions, BCG-related lymphadenitis is the most common complication and can be classified as follows:^{12,13,14}

- Regional BCG Lymphadenitis
- Disseminated BCG Infection

• *Regional BCG Lymphadenitis*

The term regional BCG lymphadenitis refers to ipsilateral regional lymph node enlargement occurring after BCG vaccination. The following clinical features favor a diagnosis of BCG-related regional lymphadenitis over other causes of lymphadenopathy:

- History of BCG vaccination in the ipsilateral arm.
- Onset of lymph node enlargement within 2 weeks to 6 months following BCG vaccination.
- Age less than 2 years.
- Absence of constitutional symptoms, such as fever, weight loss, or poor general health.
- Non-tender lymph node enlargement.
- Predominant involvement of the ipsilateral axillary lymph nodes, although the supraclavicular and cervical lymph nodes may also be affected, either alone or in association with axillary lymphadenopathy.
- No distant lymphadenopathy or organomegaly.

Regional BCG related lymphadenitis is further classified into non-suppurative and suppurative BCG Lymphadenitis.

✓ *Non Suppurative BCG Lymphadenitis*

It is the most common presentation of BCG-related lymphadenitis. It typically develops within 2 weeks to 6 months following BCG vaccination and most frequently involves the ipsilateral axillary lymph nodes. Less commonly, the supraclavicular or cervical lymph nodes may be affected, either in isolation or in combination with axillary lymphadenopathy. In most cases, the enlarged lymph nodes undergo spontaneous regression over time without intervention, although a proportion may progress to the suppurative form.

✓ *Suppurative BCG Lymphadenitis*

It is characterized by the progressive enlargement of regional lymph nodes with the accumulation of purulent material resulting in fluctuation. This is often accompanied by overlying erythema and edema. If left untreated, the affected lymph node may rupture, resulting in sinus tract formation, a prolonged clinical course, and subsequent scar formation.

• *Disseminated BCG Infection*

Disseminated BCG infection is defined as the involvement of anatomical sites beyond the BCG vaccination site and the ipsilateral regional lymph nodes. It is also referred to as systemic BCG disease, disseminated BCG disease, or BCG osis. This condition is uncommon and is most frequently encountered in children with underlying immunodeficiency, particularly defects in cell-mediated immunity.¹⁵

Currently, there are no universally accepted treatment guidelines for BCG vaccine-induced suppurative lymphadenitis. Several studies advocate for conservative management, including pharmacological therapy and needle aspiration, while discouraging active surgical intervention.^{13,16}

In a case report by Uttara Gautam et al., patients diagnosed with tuberculous lymph nodal abscess were initiated on anti-tubercular therapy (ATT) and showed complete resolution.¹⁷

In a study done by Indumathi et al. infants with suspected or confirmed disseminated disease received ATT and showed good outcome.¹⁸ In our case also, after completion of the full course of anti-tubercular therapy, the patient demonstrated a favorable clinical response, consistent with findings reported in the above studies.

III. CONCLUSION

A high degree of clinical suspicion for BCG lymphadenitis should be maintained in infants who have been recently vaccinated. Differentiating this condition from tuberculous lymphadenitis can be difficult, as the cytomorphologic patterns in both are often similar. However, distinguishing between these entities is crucial because their management strategies differ.

FNAC combined with clinical findings and vaccination history, offers a rapid, safe, and cost-effective approach for early diagnosis. This facilitates appropriate management of BCG lymphadenitis while avoiding unnecessary anti-tubercular therapy.

Enhanced awareness of this uncommon complication among healthcare providers, paramedical staff, and parents can help prevent misdiagnosis, promote appropriate management, and improve clinical outcomes.

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