

## TEACHING FILES (GRAND ROUNDS)

**TWINS WITH TUBERCULOUS ABSCESES IN THE LEFT THIGH VACCINATION SITE - IS IT BCG OR MYCOBACTERIUM TUBERCULOSIS?**

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**Clinical Problem:**

Patient 1, a 3-month-old girl, born preterm in March 2024 at 34 weeks and 4 days with a birth weight of 1.9 kg, was the first-born twin. She was admitted to the neonatal intensive care unit (NICU) for 10 days due to neonatal hyperbilirubinemia (NNH). She received the Bacillus Calmette-Guérin (BCG) and Hepatitis B vaccines 3 weeks after birth. She presented in June 2024 with a painful, erythematous lump over the left thigh injection site, first noticed 1 month post-vaccination. There is no history of tuberculosis (TB) contact. On presentation, her weight was 3.71 kg (below 3<sup>rd</sup> percentile as per Indian Academy of Pediatrics (IAP) growth charts). On examination, a tender, mildly erythematous swelling was present in the left thigh with mild purulent oozing. No scar was seen over the left deltoid. Other general and systemic examinations were normal. Thigh ultrasound (USG) showed a thick, irregularly walled collection in the intramuscular plane measuring 2.1x1.8x1.4 cm containing 2.8 mL of fluid showing moving internal echoes, suggestive of an abscess. She was given oral amoxicillin-clavulanic acid for 5 days. A repeat USG found 2.3 mL of fluid. USG-guided drainage was done following which the volume reduced to 0.3 mL. She was discharged on oral linezolid for 12 days. Pus sent for Xpert MTB/RIF detected Mycobacterium tuberculosis complex (MTBC) and reported it as rifampicin sensitive. Other investigations are shown in Table 1. She was prescribed a local betadine ointment and was asked to follow-up with a repeat USG.

Patient 2, a 3-month-old girl, was the second-born twin with birth weight of 1.75 kg. She was also admitted to the NICU for 10 days due to NNH. She also received the BCG and Hepatitis B vaccines 3 weeks after birth. She presented in June 2024 with a painful lump over the left thigh injection site, first noticed 1 month post-vaccination. On presentation, her weight was 3.7 kg (below 3<sup>rd</sup> percentile as per IAP growth charts). On examination, a tender, warm swelling was present in the left thigh measuring approximately 1.5 x 1 cm with a pus point. Other general and systemic examinations

were normal. Thigh USG showed a thick, irregularly walled collection in the intramuscular plane measuring 2.8x2.0x1.3 cm containing 4.0 mL of fluid showing moving internal echoes, suggestive of an abscess. USG-guided drainage was done and the pus sent for Xpert MTB/RIF which detected MTBC and reported it as rifampicin sensitive. She was also discharged on oral linezolid for 12 days. Other investigations are shown in Table 1. A follow-up USG showed 3.6 mL of fluid. She was advised another USG-guided drainage and asked to follow-up one week post-procedure.

*Should the twins be started on anti-tubercular therapy (ATT)? Why was MTBC detected from the injection sites?*

**Discussion:**

The BCG vaccine is routinely administered to Indian newborns at birth along with the hepatitis B and oral polio vaccines. The usual site of administration of BCG is intradermally in the left upper arm.<sup>1</sup> Although BCG is a relatively safe vaccine, there have been certain adverse effects reported with its administration. Most commonly they are local or regional adverse effects including skin ulceration, injection-site abscesses, keloid formation and BCGadenitis.<sup>2</sup> Technical errors in vaccine administration include subcutaneous administration, excessive dose administration and incorrect site of administration, all of which can result in abscess formation.<sup>2</sup>

Thigh abscess following incorrect BCG administration has been reported by Namshan et al.<sup>2</sup>, and Sedighi et al.<sup>3</sup>, in five and three infants respectively. They presented with a slowly progressive, non-tender thigh swelling. The onset was variable ranging from birth to 6 months post-vaccination.<sup>2,3</sup> Three patients additionally had a sudden increase in the size of the swelling within 2 weeks of presentation. No systemic signs or symptoms were reported in any patients. Radiological confirmation was done through either USG or magnetic resonance imaging (MRI).<sup>2,3</sup> Specimen for microbiological testing was obtained either through needle aspiration or incision and drainage. Mycobacterium bovis (the organism from which BCG is derived) was identified from the pus sample in all cases except one, either through culture or polymerase chain reaction (PCR).<sup>2,3</sup> Five patients were treated with 6 months of isoniazid and rifampicin, one was treated with 6 months of isoniazid, rifampicin, ethambutol and clarithromycin

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**Table 1.** Investigations of the patient.

Investigations	Patient 1	Patient 2	Reference Range
Hemoglobin (gm/dL)	9.2	10.1	11.5-15.5
White blood cell count (cells/cumm)	10,590	26,220	5000-13,000
Absolute neutrophil count (cells/cumm)	5546	10,795	2000-8000
Absolute lymphocyte count (cells/cumm)	4080	12,902	1000-5000
Platelets (106 cells/cumm)	5.50	5.96	1.50-4.50
C-reactive protein (CRP) (mg/L)	1.39	4.88	<3.00
Blood culture	No growth	No growth	-
Aerobic pus culture	No growth	No growth	-
Anaerobic pus culture	No growth	No growth	-

and two did not receive ATT. Prognosis was good with all patients showing normal growth and development.<sup>2</sup>

The incorrect administration of BCG in the thigh may be due to several possible reasons. The confusion between BCG and vitamin K injection, usually administered intramuscularly in the right thigh, or between BCG and hepatitis B vaccine, usually administered intramuscularly in the left thigh, may lead to such an error.<sup>2,3</sup> The use of the same syringe for both BCG and hepatitis B vaccination, may lead to BCG inoculation intramuscularly.<sup>2</sup> Tubercular thigh abscess has also been reported following hepatitis B vaccination.<sup>4,5</sup>

In our patients, the absence of the BCG scar on the left upper arm along with MTBC detection on Xpert MTB/RIF assay, which is capable of detecting *Mycobacterium bovis*<sup>6</sup>, is suggestive of a tubercular abscess likely due to incorrect BCG administration in the thigh. We decided to treat our patients as BCG abscess cases. According to the National Tuberculosis Elimination Programme (NTEP) guidelines, BCG abscesses do not warrant treatment and should be allowed to spontaneously regress over weeks to months. If there is suppuration and increase in the swelling size, as in our cases, needle aspiration should be done to prevent rupture and ulceration.<sup>7</sup> If pus is thick, as visualised on USG as thick internal echoes in our cases, excision and drainage should be done. We advised repeat drainage in patient 2 due to refilling, as per NTEP guidelines. Furthermore, NTEP guidelines have found antibiotics and ATT to be ineffective in improving outcomes in BCG abscesses and do not recommend their use.<sup>7</sup> Hence, we did not start our patients on ATT and advised close follow-up instead.

**Compliance with ethical standards**

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**Conflict of Interest:** None

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