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CASE REPORT **OPEN ACCESS**

Sternal Mystery: Granulomatous Mass Post-BCG In An Infant – A Rare Surgical Encounter

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A B S T R A C T

Background: The Bacillus Calmette-Guérin (BCG) is a vaccine which is widely administered in newborns to protect against tuberculosis. Although generally safe, BCG vaccination can occasionally lead to uncommon local or systemic complications, including granulomatous inflammation at sites distant from the inoculation site [1,2].

Case Presentation: A case report of a 7-month-old previously healthy male infant, presented with a firm, non-tender anterior sternal mass of three weeks' duration. There were no systemic symptoms, No history of trauma, or no known infectious exposures. Imaging revealed a well-circumscribed soft tissue mass anterior to the sternum without underlying bony involvement. Histopathological examination following surgical excision demonstrated granulomatous inflammation, with no evidence of acid-fast bacilli or malignancy. Given the patient's history of neonatal BCG vaccination and exclusion of alternative diagnoses, a diagnosis of BCG vaccine-associated granulomatous inflammation was made [3,4].

Management and Outcome: The patient underwent wide local excision of the mass and sent for histopathological evaluation. Postoperative recovery was uneventful. Wound was reviewed on post operative day 3 and 10. Follow up was done after 3 months.

Conclusion: This case highlights an unusual presentation of BCG vaccine-related granulomatous inflammation as an isolated sternal mass in infancy. Awareness of such rare post-vaccination complications is crucial for prompt diagnosis and appropriate surgical management to achieve complete resolution and avoid unnecessary delays in care [5].

Keywords: BCG vaccine complication, Granulomatous inflammation, Sternal mass in infants, Vaccine-induced granuloma, non-tuberculous granuloma, Atypical BCG reaction, Surgical excision in infants, Chest wall mass etiology.

INTRODUCTION

The Bacillus Calmette-Guérin (BCG) vaccine administered to protect against tuberculosis. Although generally safe, it can occasionally lead to local or systemic complications [1,2,6]. We report a rare case of granulomatous inflammation manifesting as a sternal mass in an infant, expanding the differential diagnosis for paediatric chest wall swellings [5].

CASE PRESENTATION

A 7-month-old healthy boy presented with a progressively enlarging anterior sternal swelling of 3 weeks duration. A full-term male infant with a history of normal vaginal delivery and BCG vaccination at birth, presented with a non-tender, well-circumscribed mass over the mid-sternum, measuring approximately 1.5 × 1 cm, which had been noticed by the parents three weeks prior. The swelling was not associated with overlying skin changes, fever, weight loss, or a history of trauma, recent infections, or contact with tuberculosis patients.

On *physical examination*, there were no signs of erythema, warmth, or ulceration, and no lymphadenopathy or other systemic findings. Investigations showed normal complete blood count.

Fig 1a. On Examination- 1.5cm x 1 cm, globular mass, firm, restricted mobility over the anterior aspect of sternum.

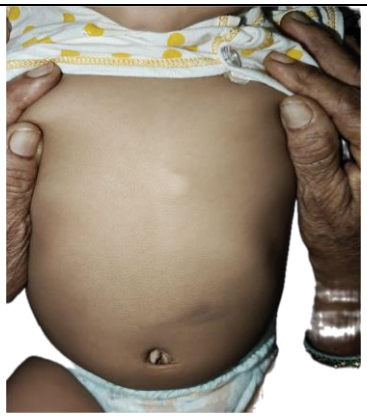

Fig 1b. No signs of inflammation, ulceration or secondary changes

CECT scan suggested a mild, ill-defined hypo-dense lesion in the subcutaneous plane of the anterior chest wall with mild contrast enhancement, consistent with a vascular malformation, without intrathoracic extension.

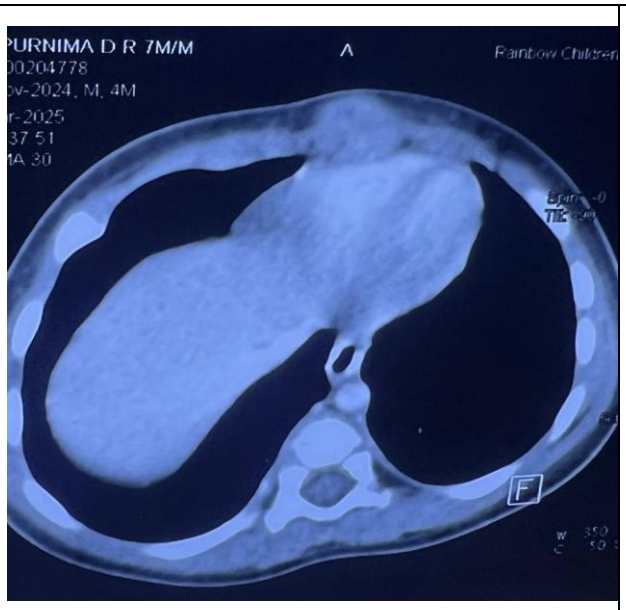

Fig 2a. Ct – Thorax

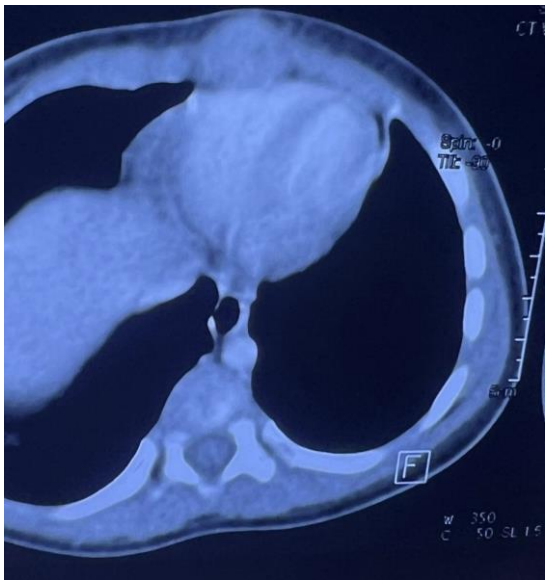

Fig 2b. ill defined hypo dense lesion of size 2x 1.5 cm in subcutaneous plane in midline of anterior chest wall

USG Guided FNAC – A USG-guided aspiration cytology was performed to aid in treatment planning, showing a collection of epithelioid histiocytes.

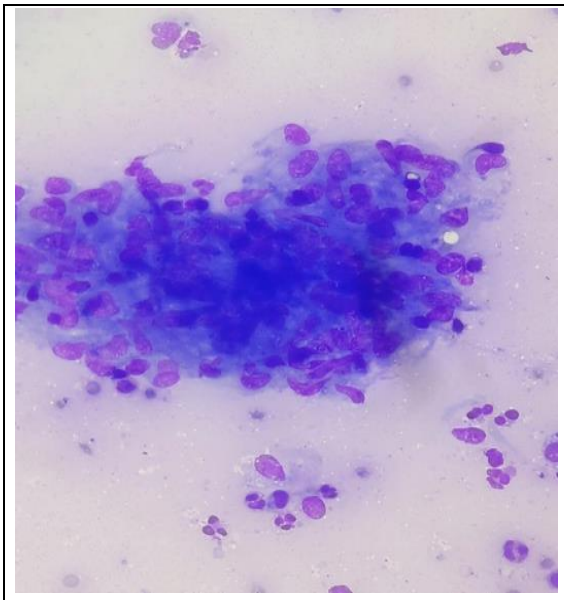

Fig 3a. FNAC aspiration cytology; High power

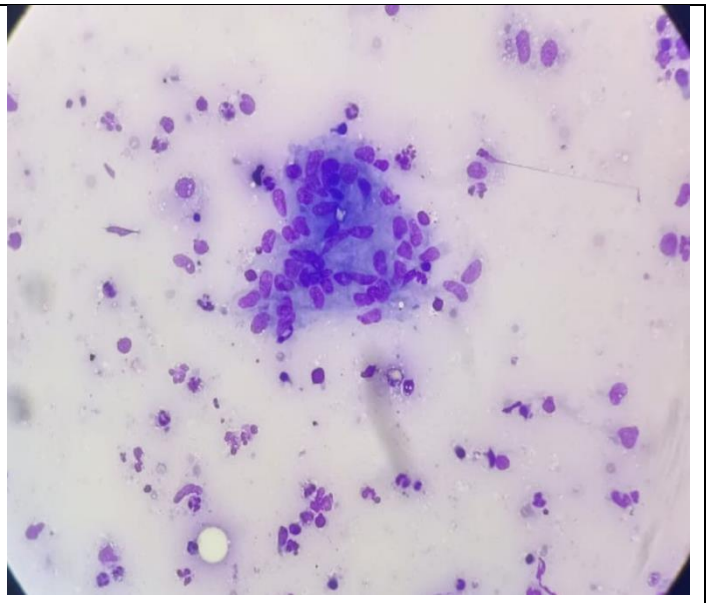

Fig 3b. Collections of epithelioid histiocytes

Management and Outcome

Given the persistence of the mass, its progressive enlargement over three weeks, and the uncertainty of its etiology at presentation, surgical intervention was pursued. The child underwent wide local excision of the anterior sternal mass under general anesthesia.

Intraoperatively, a well-circumscribed, firm mass in the subcutaneous plane overlying the sternum, without evidence of invasion into underlying bone, deeper structures, or mediastinum. The mass was completely excised with a margin of normal tissue. Gross examination revealed a fibrous, firm lesion with central necrosis.

Histopathological analysis confirmed Epithelioid cell Granuloma inflammation.

- Macroscopically: A small globular dark brown tissue measuring 1.5 cm × 1.4 cm × 0.6 cm
- Cut sections: Cyst filled with yellow thick material
- Microscopically: Fibrocollagenous tissue partly lined with granulation tissue, inflammatory cell infiltrates comprising lymphocytes, plasma cells, histiocytes, occasional neutrophils, and epithelioid granulomas with multinucleated giant cells, scattered histiocytes were noted.
- ZN stain for AFB and GMS stain for fungal elements were both negative.

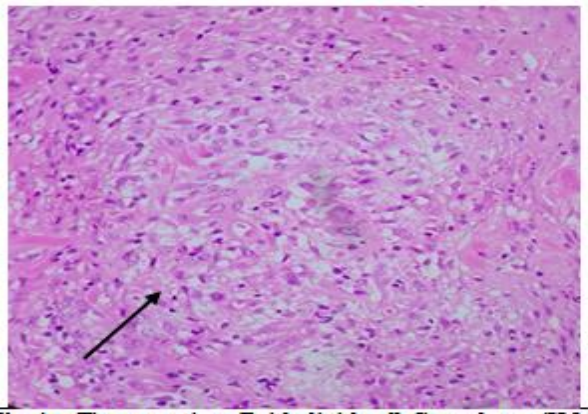

Fig 4a. Tissue section; Epithelioid cell Granuloma (H& E x 400)

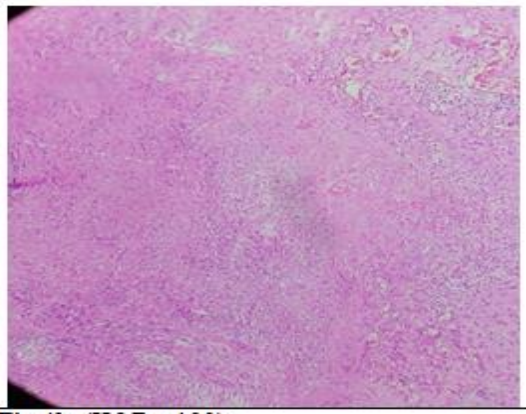

Fig 4b. (H&E x 100)

The *postoperative course* was uneventful, and the surgical wound healed without complications. The child remained systemically well throughout.

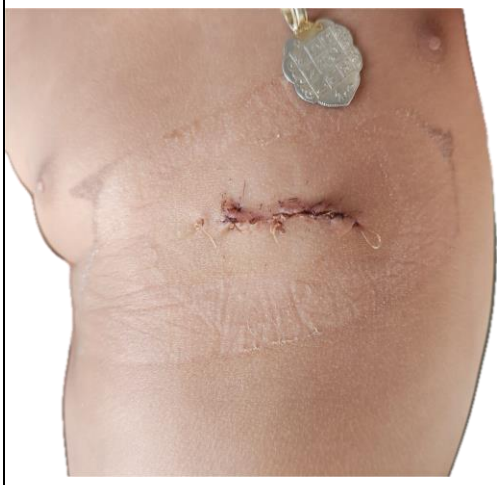

Fig 5a. POD-3 wound is healing well, no signs of inflammation or discharge

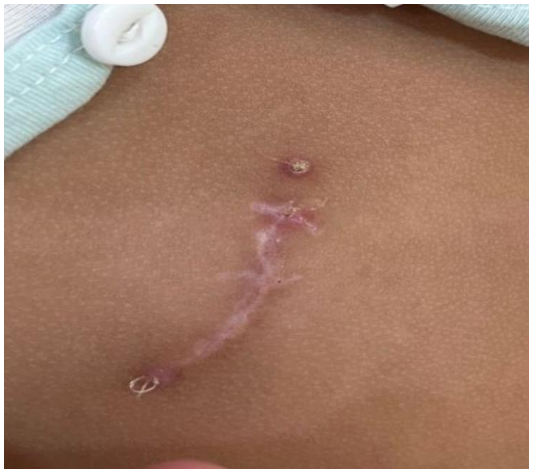

Fig 5b. POD-10- scar formation is seen. Scar is healthy.

During Follow up the child was monitored weekly for the first month and then once a month for 3 months. After 3 months, the scar appears to have healed and no signs and symptoms of recurrence.

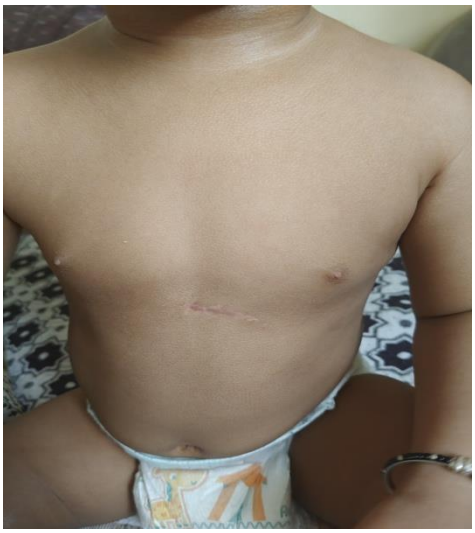

Fig 5c. Follow up after 3 months – no signs of recurrence

DISCUSSION

Complications following BCG vaccination are generally uncommon but can occasionally present as localized or disseminated granulomatous lesions [1,3,9]. Local complications typically involve the site of vaccination or adjacent lymph nodes; distant lesions, such as chest wall masses, are rare [5].

Granulomatous inflammation secondary to BCG vaccination is believed to result from either an excessive local immune response or inadvertent dissemination of attenuated Mycobacterium bovis bacilli [6,7]. Although BCG-related osteomyelitis of the sternum has been reported, isolated soft tissue granulomatous masses without bone involvement, as seen in this case, are exceedingly rare.

The differential diagnoses for a chest wall mass in infancy include congenital lesions (e.g., dermoid cysts: 10–15%; hemangiomas: 20–25%), infections (e.g., bacterial abscess: 5–10%; tuberculosis: ~5%), and neoplastic processes (e.g., rhabdomyosarcoma: 10–15%; lymphoma: 5–10%) [8]. Other possibilities include neurogenic tumors (5–10%) and lipomas (about 5%) [8].

In this case, the clinical presentation, imaging findings, and pathological features were suggestive of a benign, vaccine-related inflammatory process. Nevertheless, due to the progressive nature of the swelling and diagnostic uncertainty, wide local excision was warranted both for definitive diagnosis and therapeutic purposes

Histopathology remains the cornerstone in establishing a definitive diagnosis, particularly in excluding neoplastic or infectious causes. Negative mycobacterial cultures and absence of acid-fast bacilli helped confirm the non-infectious granulomatous nature of the lesion.

Early surgical excision in selected cases not only provides diagnostic clarity but also prevents potential complications such as secondary infection, mass effect on adjacent structures, or parental anxiety regarding the nature of the lesion [9].

CONCLUSION

We report a rare case of isolated anterior sternal granulomatous inflammation following BCG vaccination in an infant, managed successfully with wide local excision. The report draws attention to BCG-related complications as a crucial consideration in the differential diagnosis of chest wall masses in children. particularly in regions where BCG vaccination is routine [5,6].

Accurate diagnosis relies on a combination of clinical suspicion, imaging, histopathology, and microbiological evaluation. When diagnostic uncertainty persists or the lesion is progressive, surgical excision not only aids diagnosis but also serves as definitive treatment. Regular follow up of the child is required for potential recurrence.
Increased awareness of this rare presentation can help clinicians manage such cases appropriately and avoid unnecessary delays in care [9].

Conflict of interest – there is no conflict of interest in this case scenario

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