CASE REPORT

Tuberculous gumma: a forgotten entity in the UK

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SUMMARY

A 24-year-old immunocompetent Pakistani man presented with multiple subcutaneous abscesses that had developed and persisted over 2 months. After surgical incision and drainage, *Mycobacterium tuberculosis* was isolated (MTB). Further investigation yielded positive sputum cultures confirming pulmonary tuberculosis (TB) too. The patient was started on standard quadruple therapy for disseminated haematogenous TB in the form of tuberculous gumma and pulmonary TB.

BACKGROUND

Mycobacterium tuberculosis (MTB) is commonly found in the pulmonary system (51.6%) due to inhalational transmission, but other organ systems including gastrointestinal (4.9%), spinal (4.2%), meningeal (2.1%) and genitourinary (1.6%) systems are also involved albeit less frequently.¹ Cutaneous manifestations of tuberculosis (TB) are uncommon. Metastatic tuberculous abscesses (also known as tuberculous gumma) are a rare and unusual presentation of cutaneous TB that is commonly located on the extremities and commonly found in the immunocompromised. We reported a case of an *immunocompetent* adult who presented with tuberculous gumma, consistent with MTB infection.

CASE PRESENTATION

A 24 year-old man, originally from Pakistan and studying in the UK, presented with a history of left foot discomfort over the preceding 2 months. This worsened with the appearance of a large fluctuant abscess over the dorsum of the foot. He also had intermittent fevers, lethargy and poor appetite for 6 months. He denied previous TB exposure or a family history of TB. He had multiple courses of antibiotics, with little resolution of his symptoms. On examination, he was noted to have multiple

Figure 1 Tuberculous gumma located on the anterior chest wall.

Figure 2 Tuberculous gumma on the dorsum of the left foot after incision and drainage.

abscesses on his anterior chest wall (figure 1), left ischium, right elbow, left scapula, dorsum of the left foot (figures 2 and 3) and left anterior thigh (figure 4). Systemic examination was normal and observations were within normal range.

INVESTIGATIONS

Routine investigations revealed a normal blood count but an elevated C reactive protein. Blood biochemistry was normal. An HIV test was negative and peripheral blood cultures remained negative.

This was initially believed to be pyogenic in origin and he underwent incision and drainage of the abscesses on the dorsum of his left foot, left ischium and left anterior thigh. Approximately 600 mL of frank pus was drained in total. Samples sent for microscopy, culture and sensitivity isolated MTB after 2 weeks from all three samples. This was sensitive to all first-line anti-TB agents. A chest radiograph was organised after diagnosis and this showed no evidence of pulmonary disease although a spontaneous sputum sample cultured MTB after 4 weeks of incubation.

DIFFERENTIAL DIAGNOSIS

The differential diagnoses of such a case were pyogenic infections such as syphilis, pyoderma

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Figure 3 Tuberculous gumma on the lateral aspect of the right foot.

gangrenosum, atypical mycobacterial lesions and some fungal infections. Given that MTB was isolated, a diagnosis was clearly made.

Figure 4 Tuberculous gumma on the left leg after incision and drainage.

TREATMENT

He was started on quadruple anti-TB therapy—rifampicin, isoniazid, pyrazinamide and ethambutol.

OUTCOME AND FOLLOW-UP

On treatment, he clinically improved, gained weight and all the subcutaneous lesions cleared completely leaving only some small scars with no sinuses at the site of drainage. The VNTR typing from the reference laboratory revealed that the isolates from the sputum and the subcutaneous collection was the same suggesting a haematogenous spread. As this subject did not exhibit any other symptoms attributable to other organ systems, further investigations such as a CT scan to see the extent of disease were not mandated. Subsequent investigations of a possible immunodeficiency state have shown normal CD3, CD4 counts and a normal CD4:CD8 ratio.

DISCUSSION

Cutaneous TB is a rare cause of extrapulmonary MTB, only occurring in 1% of those infected.² The majority of skin lesions are affected by *Mycobacterium* other than TB. Tuberculous gumma is a form of cutaneous TB caused by haematogenous dissemination of *M tuberculosis*. Clinically, it is difficult to differentiate this form from other pyogenic infections such as syphilis, pyoderma gangrenosum, atypical mycobacterial lesions and some fungal infections. Diagnosis of tuberculous gumma can be on the histological pattern of widespread caseation necrosis.³ Isolation of the organism not only confirms diagnosis but also guides treatment by identifying the sensitivities of the organism.

Tappeiner and Wolff classified cutaneous *Mycobacterium* broadly into exogenous and endogenous sources.^{4 5} Exogenous spread is rarely observed given that it typically requires a break in the skin with direct inoculation of MTB in individuals naive to MTB infection. Case reports suggest that the aetiology of such spread is usually secondary to needle stick injuries, BCG vaccine and therapeutic injections. These are unlikely in our patient, given that he had two positive isolates of MTB-cutaneous and pulmonary-emphasising previous infection.^{5 6} Conversely, an endogenous spread is typically found in those who have had prior infection with mycobacterium.⁴ This may be by direct extension of the disease from underlying infection such as lymphadenitis or bone/joint infection as seen in scrofuloderma or present after haematogenous spread typically seen in millitary TB, lupus vulgaris or tuberculous gumma (the likely cause in this case). Interestingly, as far as we are aware, this patient had no other localisations of TB other than his skin and lungs despite this likely being caused by haematogenous spread.

Prospective studies in India, Pakistan and Ethiopia have looked at the clinical presentation and epidemiology of cutaneous TB with <10% presenting as tuberculous gumma.^{7 8} Of the 202 patients analysed only 18 had a diagnosis of tuberculous gumma. Compared to other forms of cutaneous TB, TB verrucosa and scrofuloderma had smaller numbers.⁸ TB verruca cutis occurs due to direct inoculation of MTB into the skin of a previously sensitised host. Scrofuloderma arises from a direct extension of infection from deeper structures on to the overlying skin. Tuberculous gumma are typically firm, single or multiple non-tender erythematous nodules that often present in malnourished children or immune deficient adults.³ Occasionally, the lesions break down and discharge their contents or persist and form sinuses. The importance of identifying tuberculous gumma from other causes of abscesses and types of cutaneous TB is that it suggests *haematogenous dissemination* of TB. This may result in multiple organ systems

becoming involved and as well as the development of potential complications secondary to TB. Also, the fact that it occurs more often in those who are immunocompromised suggests the possible need to investigate for an underlying immunodeficiency. Although investigations to date show that our participant was immunocompetent, one has to question whether an underlying immunodeficiency exists for such a rare presentation.

The HIV epidemic has strong associations with increasing susceptibility to TB, reactivation of TB and spread.⁹ Although our participant was HIV negative, one has to question whether other immunodeficiency states can account for his presentation and dissemination of MTB. Interferon γ (IFN- γ) and interleukin 12 (IL-12) pathway defects have been implicated in increasing susceptibility in MTB.¹⁰ *Mycobacterium*, an intracellular bacterium that can avoid cell-mediated immunity cannot completely avoid the host response. Once phagocytosed by the macrophage, subsequent cytokine production (IL-2, IL-12 and IL-18) can stimulate production of IFN- γ by CD4T cells and natural killer cells, promoting IFN- γ receptor binding to its macrophage receptor. This leads to enhanced antigen processing through tumour necrosis factor α and the production of toxic intermediates which ultimately destroy *Mycobacterium*.¹¹ Mutations of IFN- γ receptors and IL-12 receptors or defects in IFN- γ /IL-12 pathways (as depicted in knock-out models of mice) have been identified which results in increased susceptibility to infection with MTB. This may be due to failure of protective immunity after vaccination with BCG or the reduction in IFN- γ pathways allowing development of active disease.¹⁰

Learning points

- ▶ *Mycobacterium tuberculosis* is an organism that can manifest itself in multiple organs including the skin as described in our case report.
- ▶ Although the prevalence of MTB is low in the developed countries, this case highlights the need to be watchful and open-minded when it comes to uncommon presentations of diseases.
- ▶ This case also highlights the importance of sending specimens for bacteriology and specifically for acid-fast bacilli (both smear and culture) when presented with such a wide differential diagnosis, to arrive at a confirmative diagnosis.
- ▶ A high index of suspicion combined with submitting samples to pathology and microbiology will in most instances provide a confirmative diagnosis and the ability to treat and cure this uncommon condition.
- ▶ Furthermore, diagnosis of such a rare condition may prompt the physician to explore *why* the condition occurred.

Contributors NW, CK and MAN were involved in the patient care and follow-up.

Competing interests None.

Patient consent Obtained.

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