

Case Report

Cutaneous tuberculosis: a case contracted from needle prick injury

皮膚結核病：一個針刺感染病例

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This is a case report of a 30-year-old man who contracted cutaneous *Mycobacterium tuberculosis* after a needle prick injury with an infected specimen. Polymerase chain reaction (PCR) was able to give a rapid diagnosis. Routine culture was still required to guide the choice of anti-tuberculosis regime. The role of PCR in the diagnosis of cutaneous *Mycobacterium* infection was discussed.

病例報告。三十歲男性患者，在接觸受感染標本時，意外地遭針刺傷而患上皮膚結核病。用多聚酶鏈反應能作快速診斷。常規培養仍須進行，以便選取適當的抗生素治療法。多聚酶鏈反應在皮膚結核病中的作用將予討論。

Keywords: Cutaneous *Mycobacterium tuberculosis* infection, polymerase chain reaction

關鍵詞：皮膚分枝結核桿菌感染，多聚酶鏈反應

Introduction

Cutaneous tuberculosis is caused by *Mycobacterium tuberculosis*. The clinical presentation depends on the route of infection and host's immunity. Making the diagnosis of cutaneous tuberculosis is important as the infection responds well to anti-tuberculosis treatment. Apart from clinical

features, histopathology and culture, polymerase chain reaction for *Mycobacterium tuberculosis* is becoming an important tool for diagnosis.

Case report

A 30-year-old laboratory technician presented with a persistent nodule over his left thumb for the past two months. Apart from occasional mild tenderness, he was asymptomatic. He had a history of a needle prick injury over his left thumb while handling a specimen two months ago. The specimen was collected from a patient suspected to have pulmonary *Mycobacterium tuberculosis* infection. After the injury, a mildly tender erythematous nodule grew slowly over his left

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thumb. The lesion did not respond to several courses of oral antibiotics. He had no systemic upset or any weight loss during that period. The patient did not keep tropical fish. On examination, a solitary 1 cm x 1.3 cm erythematous nodule was noticed over his left thumb (Figure 1). There was no ulceration. No pus or abscess could be expressed from that nodule. Regional lymph node was not enlarged. With the aforementioned history, infective cause was high on the list. The differential diagnoses were cutaneous tuberculosis, atypical Mycobacterial infection, deep fungal infection and foreign body granuloma in that order.

A punch biopsy was obtained from patient's left thumb and sent for histology examination, fungal culture, Mycobacterial culture and polymerase chain reaction (PCR) for Mycobacterium tuberculosis. The histology showed features of parakeratosis with neutrophilic infiltrate in the epidermis. Multiple granulomas composed of aggregates of epithelioid histiocytes were noted in the dermis. Caseous necrosis and Langhan's type of giant cells were also identified (Figure 2). Acid-fast bacilli were demonstrated by Ziehl

Neelsen stain while fungus stain was negative (Figure 3). PCR demonstrated the presence of Mycobacterium tuberculosis/bovis DNA. Chest X-ray of the patient was normal but the tuberculin test was positive. Hence, the patient was diagnosed suffering from tuberculosis verrucosa cutis. In fact, the specimen that our patient handling during the incidence was found positive for acid-fast bacilli (AFB) smears and culture. The latter grew Mycobacterium tuberculosis that was resistance to isoniazid and ethambutol. The patient was referred to Chest clinic for further management.



Figure 1. A solitary 1 cm x 1.3 cm erythematous nodule over patient's left thumb.

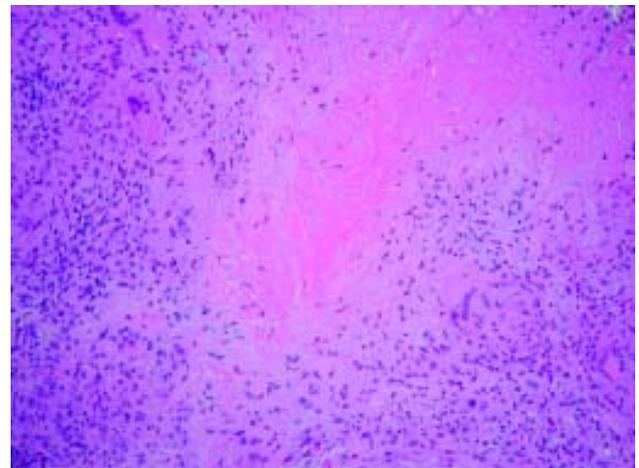


Figure 2. Necrotizing granulomatous inflammation with Langhans type giant cells was shown in H&E stain. (Courtesy of Dr KC Lee)

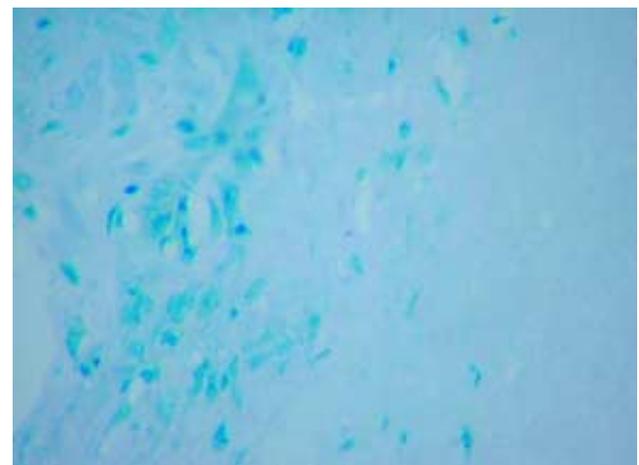


Figure 3. In Ziehl Neelsen stain, an AFB was shown in centre. (Courtesy of Dr KC Lee)

Discussion

Mycobacteria are acid-fast, weakly gram-positive non-motile rods. There are more than 60 species of organisms belong to the genus *Mycobacteria*. Runyon classified *Mycobacteria* based upon their rate of growth, ability to form pigment and their colony characteristics. Clinically, *Mycobacterium tuberculosis*, *Mycobacterium bovis* and very rarely the attenuated bacillus Calmette-Guerin (BCG) cause all forms of cutaneous tuberculosis. Acid-fast means the organisms are able to retain the carbol fuchsin dye after washing with acid or alcohol as a result of high mycolic acid and fatty acid content in their cell walls.

Cutaneous tuberculosis can be infected through direct inoculation from exogenous source or spreading from an endogenous focus. Clinically it is divided into true cutaneous tuberculosis where AFB can be identified or tuberculides where no focus of active tuberculosis can be detected either by histology or culture. True cutaneous tuberculosis is further subdivided into tuberculosis chancre, tuberculosis verrucosa cutis, lupus vulgaris, scrofuloderma, miliary tuberculosis and orificial tuberculosis. Lichen scrofulosorum, erythema induratum and papulonecrotic tuberculids are the main types of tuberculides. The manifestation of different types of true cutaneous tuberculosis depends on the route of infection and host's immunity. Their inter-relationship is summarised in Table 1.

Cutaneous *Mycobacterium tuberculosis* was uncommon. In a survey by the Social Hygiene Service between the period 1983 and 1992, it

only accounted for 0.066% of all new skin cases. While the majority of the CTB was tuberculides, only 14.8% was true cutaneous tuberculosis with lupus vulgaris being the commonest.¹

Making the diagnosis of cutaneous tuberculosis is sometimes challenging. In addition to the traditional smear examination and culture, PCR technique is increasingly utilized. Although PCR is available for more than ten years, there has been no large-scale study to assess the clinical usefulness in evaluation of cutaneous tuberculosis. The clinical usefulness of PCR in the diagnosis of lupus vulgaris and scrofuloderma were largely based upon isolated case reports.^{2,3} The identification of *Mycobacterium tuberculosis* DNA in some cases of tuberculides may strengthen or even confirm the casual relationship between *Mycobacterium tuberculosis* and tuberculides.^{4,5} Recently Tan et al reported the clinical utility of PCR assay in the diagnosis of different types of cutaneous tuberculosis.⁶ A total of one hundred and nineteen archival skin biopsy specimens of cutaneous tuberculosis were analysed by PCR assay targeting IS6110 of *Myobacterium tuberculosis* DNA. The archival specimens were divided into multibacillary infection, paucibacillary infection and tuberculides. Twenty-four non-tuberculosis granulomas and normal skin were used as control. Most of the multibacillary infections were collected from immunocompromised patients. Tuberculous verrucosa cutis and lupus vulgaris were the predominant clinical diagnosis in paucibacillary infection. Results showed that the sensitivity and specificity of PCR were approaching 100% in multibacillary infection where the positive predictive value was around 50% to 60% in both paucibacillary

Table 1. The inter-relationship between the route of infection and host's immunity in true cutaneous tuberculosis infection.

	Exogenous inoculation	Endogenous spread
Prior exposure with high cell-mediated immunity	Tuberculosis verrucosa cutis	Lupus vulgaris
No prior exposure or low cell-mediated immunity	Tuberculosis chancre	Scrofuloderma, miliary tuberculosis, orificial tuberculosis

infection and tuberculides. It was suggested that PCR definitely play an important role in evaluation of multibacillary cutaneous mycobacterial infection because of its rapidity to differentiate *Mycobacterium tuberculosis* from other atypical mycobacterial infection. While the role in evaluation of paucibacillary *Mycobacterium tuberculosis* and tuberculides is still uncertain.

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