A case of erythema induratum with pulmonary tuberculosis

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Abstract
Erythema induratum is a chronic, nodular eruption that usually occurs on the lower legs of young women. It has been regarded as a manifestation of tuberculin hypersensitivity (i.e., a type of tuberculid occurring on the legs). The etiopathogenesis of erythema induratum and its relation to tuberculosis are still controversial. We reported a case of 17-year-old girl, with painful lower limb nodular lesions and abnormal chest radiography. Subsequently, she was confirmed to have erythema induratum and pulmonary tuberculosis.

Keywords: Erythema induratum, Pulmonary tuberculosis

Case report
The patient, MY, was a 17-year-old girl. She was born in Hong Kong, all along enjoyed good past health and had received full vaccinations. She had onset of painful nodular lesions over bilateral her lower limbs 2 months before admission to our hospital. The lesions were multiple, circular in shape, raised, painful with desquamation (Figure 1). Apart from the skin lesions, MY did not have any respiratory or constitutional symptom. Her mother had history of pulmonary tuberculosis 9 years ago, and had completed 6 months of anti-tuberculosis therapy. Chest radiography performed in outpatient clinic showed ill-defined air space opacities at right upper and left middle zones. She was then admitted to our isolation ward for further investigations. Skin biopsy showed marked lobular panniculitis, patches of necrosis, acute inflammatory infiltrates and epithelioid histiocytes, which were consistent with granulomatous inflammation. No acid-fast bacillus was identified on Ziehl-Neelsen stain. The diagnosis of erythema induratum was suggested. Her skin tuberculin test revealed 15 mm induration. Serial gastric lavages were negative for smear and RT-PCR of acid-fast bacillus. High-resolution Computed Tomography (HRCT) of thorax showed multiple pulmonary nodules arranged in tree-in-bud pattern (Figure 2) at the anterior segment of her right upper lobe and superior segment of her left lower lobe, which was highly suggestive of endobronchial infection. Anti-tuberculous therapy was commenced. Her gastric

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Figure 1. Photo of patient with erythema induratum at her lower limb.

Figure 2. Films of HRCT thorax showing tree-in-bud patterns and local infiltrations.
lavage for mycobacterium tuberculosis came back to be positive after 3 weeks of incubation. She received 9 months of therapy and her skin lesions mostly subsided, leaving some residual hyperpigmentation.

From 2012 to 2014, there were a total of 4 patients admitted to our unit with the diagnosis of erythema induratum. One of these cases was confirmed to be infected with mycobacterium tuberculosis. All the patients are in their teenage, with 3 females and 1 male. All of them presented with painful nodular lesions over their lower limbs without any significant systemic or respiratory symptom. Confirmation of the diagnosis was by skin biopsy. Workup for tuberculosis and other causes were done in all cases. Details of their characteristics were shown in Table 1.

**Discussion**

Erythema induratum represents nodular panniculitis, which commonly affects young women. It was first described by Bazin in 1855, when it was believed to be of tuberculosis in origin. Later on, different terms were developed to define those non-tuberculosis variants including "erythema induratum of Whitfield" and "nodular

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**Table 1. Summary of four patients with erythema induratum**

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age</th>
<th>Sex</th>
<th>Past medical history</th>
<th>Contact history with tuberculosis</th>
<th>Presenting symptom</th>
<th>Investigation</th>
<th>Confirmation of skin lesion</th>
<th>T spot test</th>
<th>HRT computed tomography</th>
</tr>
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</table>
| 1       | 17 yrs | F   | Good past health     | Mother had history of pulmonary TB 2003, completed treatment | Painful lower limbs nodules for 2 months before admission | - Chest X-ray: ill-defined air space opacity over right upper and left middle zone  
- Blood test: WCC 9.1x10⁹/L, ESR 69 mm/hr, CRP 60.6 mg/L  
- Hepatitis C serology negative  
- Mantoux test: 15 mm induration  
- Gastric lavage: AFB smear x3 and RT PCR and culture negative  
- Positive growth of AFB after 3 weeks of incubation | Skin biopsy                          | Not done                  | Normal                  |
| 2       | 11 yrs | F   | Good past health     | Nil                             | Fever for 5 days before admission with painful nodules over lower limbs | - Chest X-ray: clear  
- Blood test: clear  
- Hepatitis C serology negative  
- Gastric lavage: AFB smear x3, RT PCR and culture negative  | Skin biopsy                          | Not done                  | Normal                  |
| 3       | 15 yrs | F   | Good past health     | Maternal Grandmother had pulmonary TB 2003, completed treatment | Painful nodules over lower limbs with edema for 4 weeks before admission | - Chest X-ray: clear  
- Blood test: WCC 7.9x10⁹/L, ESR 59 mm/hr, CRP 20.3 mg/L  
- Hepatitis C serology negative  
- Mantoux test: 15 mm induration  
- EMU: AFBx3 negative  
- Gastric lavage: AFB smear x3, RT PCR and culture negative  | Skin biopsy                          | Positive                  | Non-reactive              |
| 4       | 16 yrs | M   | Good past health     | Nil                             | Mild tender lower limb rash for 2 weeks before admission | - Chest X-ray: clear  
- Blood test: WCC normal, ESR 47 mm/hr, CRP 48.2 mg/L  
- Hepatitis C serology negative  
- Mantoux test: negative  
- Gastric lavage: AFB smear x3, RT PCR and culture negative  | Skin biopsy                          | Non-reactive              | Normal                  |

Features are highly suggestive of endobronchial infection such as pulmonary tuberculosis.
vasculitis. The causes of erythema induratum and its relation to tuberculosis are still controversial as mycobacterium cannot be cultured from the skin lesions. Most authors believe that it is a result of delayed-type hypersensitivity reactions towards a pathogen. Local data published in 2006 revealed that erythema induratum is the most common form of tuberculids (86%) in Hong Kong. Around 9% of patients with erythema induratum had tuberculous infection. The most common site of involvement was pulmonary (50%), followed by lymphadenitis (16.7%). The female to male ratio was 11.6.

Clinically, patients usually present with painful, violaceous nodules over the posterior and anterolateral aspects of calves. It can also involve areas such as feet, thighs, buttock and forearms. There may be central ulceration or desquamation. Superimposed bacterial infection can occur. A skin biopsy with adequate amount of subcutaneous fat is essential to confirm the diagnosis. It shows features of septolobular panniculitis with primary neutrophilic vasculitis, focal necrosis and granulomatous inflammatory infiltrates. Those features suggest that there is a role of delayed type cutaneous hypersensitivity reaction. Other non-tuberculuous etiologies of erythema induratum would include infections such as chronic hepatitis B and C, and non-infectious causes such as hypothyroidism, chronic lymphocytic leukaemia, rheumatoid arthritis, Crohn’s disease and drug reaction.

Although a causal relationship has not been established between erythema induratum and tuberculosis, the followings suggest that there is an association. First, most of the patients with erythema induratum have a high degree of hypersensitivity to tuberculin skin test. Second, contact history with tuberculosis is common. Third, some of the patients with erythema induratum also have active tuberculous foci. Fourth, other forms of tuberculids can be present in the same patient such as papulonecrotic tuberculid or lichen scrofulosorum. Lastly, many patients with erythema induratum show good response to antituberculous therapy. In recent publications, there was increasing evidence that mycobacterium tuberculosis (MTB) DNA, IS6110 and mpt64, could be identified from the skin specimens of erythema induratum patients by polymerase chain reaction (PCR). Studies in the Mainland and other Asian countries revealed the presence of MTB DNA in 38 to 75% of erythema induratum. Larger scale and multi-center study will be needed to validate this finding in the future.

As tuberculosis is an endemic disease in Hong Kong, it is important to enquire about symptoms of tuberculosis and contact history in patients with erythema induratum. Investigation such as chest radiography, tuberculin skin test and sputum samples are mandatory. More sensitive and rapid test such as interferon-gamma-release assays would be beneficial to pick up latent infections. Subtle changes in chest radiography would warrant further imaging with High-Resolution Computed Tomography (HRCT) to look for any endobronchial infection or local infiltrates. In our case, although we could not identify the etiological pathogen at the beginning, the tree-in-bud pattern in HRCT was highly suggestive of tuberculous infection.

Treatment of erythema induratum would focus on the underlying cause. A nine-month course of antituberculous drug is offered to those with evidence of tuberculosis infection. Symptomatic treatment would include anti-inflammatory medications, compression stockings and supportive bandages. Systemic steroid can be considered after the diagnosis of tuberculosis has been excluded.

Conclusion

We reported a case of erythema induratum with pulmonary tuberculosis. In Hong Kong, for all cases with histological confirmation of erythema induratum, workup for tuberculosis is essential.

References