Role of Chest Computerized Tomography in Patients with Smear Negative Pulmonary Tuberculosis

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Background: Diagnosis of pulmonary tuberculosis (PTB) is usually made by compatible clinical manifestations, chest radiography (CXR), and presence of acid-fast bacilli (AFB) in sputum. However, with the limited sensitivity of staining, sometimes treatment is administered despite negative AFB smear. Role of low-dose CT (LDCT) scan in diagnosis and management of smear-negative pulmonary tuberculosis (SNTB) has never been studied before.

Objective: To compare low-dose computerized tomography (CT) with CXR in diagnosis and follow up in SNTB patients.

Method: This was a prospective study of SNTB patients who attended pulmonary clinic at Chiang Mai University Hospital from January 2017 to July 2017. The LDCT was done at diagnosis, month 2 and month 6 in addition to standard routine care. STATA statistical program version 16.0 was used for data analysis.

Result: There were 22 SNTB patients with mean age of 62.1±19.0 years. Most patients presented with chronic productive cough (90.0%), weight loss (82.0%) and fatigue (68.0%). Culture and molecular study (Gene X-pert or Line probe Assay) could identify Mycobacterium tuberculosis (MTB) in 8 of 13 cases (61%) and 10 of 12 cases (92.3%) respectively. Findings on CXR and LDCT showed multifocal alveolar lesion (27% vs 72%), pleural effusion (13% vs 23%), cavity (9% vs 9%), miliary lesions (9% vs 4%), upper lobe alveolar lesion (patchy infiltration, ground grass opacity(GGO), nodules) (77% vs 63%), and non-upper lobe lesion (23% vs 9%). LDCT could identify 7 cases (32%) of tree-in-buds (TIB) and 15 cases (68%) of mediastinal and hilar adenopathy, which were failure to observe in CXR. In most cases, after treatment, the clinical, CXR and CT were clinically improved, but no statistical significance. Symptomatic improvement at month 2 of treatment was found in 80% and 73.3% of patients presented with cough and weight loss, respectively. Improvement of GGO, cavity, alveolar and military lesions could be shown from both the CXR and LDCT. Whereas, LDCT could demonstrate the more details of improvement which could not be shown in the CXR, including TIB, pleural effusion, and lymphadenopathy (100%, 100%, 45.5% improvement, respectively).

Conclusion: LDCT is a valuable tool for diagnosis and treatment evaluation in SNTB.

Keywords: Smear negative pulmonary tuberculosis, Low-dose computerized tomography