Digital Tomosynthesis of Chest: Serial Radiographic Response in Patients with Pulmonary Tuberculosis

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**Purpose**

- The purpose of this study was to predict outcomes of TB treatment using digital tomosynthesis (DT) at presentation and at follow-up studies after antibiotic therapy.

**Background**

- Chest radiography is widely used not only in the screening and diagnosis of pulmonary tuberculosis (TB), but also plays a significant role in the evaluation of treatment response [1, 2].
- However, even in patients with active pulmonary TB disease, chest radiographs may show only subtle findings or even appear normal [2]. In patients with normal or inconclusive chest radiographs, computed tomography (CT) plays a major role in providing more precise information of TB, yet, the potential radiation hazards and relatively high costs remain problematic [1, 3] in particular in low and medium resource healthcare environments.
- Digital tomosynthesis (DT) has a lower cost and lower effective radiation dose of about 0.1 mSv (30-70 times lower than that for multidetector CT, comparable to the dose of a posteroanterior and lateral chest radiographs) [4, 5, 6].
- DT is an imaging technique based on construction of multiple radiographic image projections acquired over a limited angle and provides improved conspicuity by reducing the visual distortion from overlapping structures [7].
- Several previous studies have demonstrated that DT is superior to conventional radiography for the detection of pulmonary nodules and lung lesions in patients with pulmonary mycobacterial disease [4, 5, 8].

**Results**

- For 116 enrolled patients, final treatment outcomes were judged by WHO guidelines [9] in 110 patients, but were judged to fail in the other 6 patients.
- At 2 month follow up, sputum exams were negative in 72 patients in the success group and 2 patients in the fail group (P = 0.04, Chi test).
- DT showed improvement in 22 patients in the success group and in no patients in the fail group (P = 0.18).
- In 6 month follow up, DT showed improvement in 40 patients in success group and three patients in fail group (P = 0.11).

**Materials and Methods**

- Serial DT scans of 110 patients with DSTB (n=82) and MDRTB (n=28).
- DT scans at presentation were examined for the presence of lung abnormalities including bronchiolitis, airspace consolidation, nodules, bronchiectasis, atelectasis or volume loss, and cavities.
- DT scans at 3, 6, 12 months after initiation of treatment.
- Four board certified chest radiologists reviewed consensus retrospectively.
- Overall extent of disease was scored on a semi-quantitative %-age scale. “Improvement” was defined if the extent of disease at follow-up decreased 5% or more from initial extent.

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**References**