European Respiratory Society
Annual Congress 2012

Abstract Number: 7151
Publication Number: P642

Abstract Group: 1.3. Imaging
Keyword 1: Pleura **Keyword 2:** Imaging **Keyword 3:** Surgery

Title: Efficacy of chest CT in establishing the cause of primary spontaneous pneumothorax

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Body: Backround: The cause of primary spontaneous pneumothorax (PSP) is thought to be a rupture of a subpleural bleb or bulla (BB). Thoracoscopy is considered the gold standard in determining the presence of BB, but this is an invasive procedure that has limitations. Recent studies have shown CT to be almost as sensitive for these findings, but, these studies were either not designed specifically to test this theory, or had a small number of subjects. Objective: To evaluate the potential of chest CT for preoperative diagnosing of pathologies in PSP patients. Methods: The study included 42 patients with PSP who underwent preoperative non-contrast chest CT followed by wedge pulmonary resection and pleurodesis through mini-thoracotomy. Results of CT, surgery and pathological study of resected tissue were compared. Results: The sensitivity and specificity of CT was 96.4% and 76.5% respectively. Correlation was also found comparing the size of BB measured on CT and the pathological study. In 14 cases (30%) no BB were found on CT, during surgery or pathological examination. In all of these cases a finding known as "apical lines" (AL) was demonstrated on CT. The pathological examination of the resected lung specimens showed fibrosis and emphysema. Conclusions: We found CT to be a very sensitive method of diagnosing BB in PSP patients. The study also demonstrated the presence of AL in PSP patients which were the radiological manifestation of limited fibrotic and emphysematous changes in the apex which may be the cause of PSP in our series of patients. Preoperative diagnosis of the cause of PSP helped to employ the proper surgical technique and to prevent recurrence of PSP.