

Modern imaging: sensitivity and specificity

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The development of pulmonary infiltrates is a frequent life threatening complication in febrile immunocompromised patients, requiring early diagnosis and specific treatment. The diagnosis has therefore to be prompt, accurate and less invasive as possible, the role of imaging being crucial in this setting. The low sensitivity and the non specificity of Chest X-ray related to overlapping radiographic appearances have been largely reported in the literature. Furthermore, two or more processes may coexist, and a common diagnosis may have atypical presentations. Computed Tomography (CT) scan has a significant higher sensitivity and specificity than chest X-Ray, with a better detection of nodules, cavitary lesions as any focal or diffuse pulmonary infiltrates. In addition, it may detect any associated finding within the mediastinum, the pleura, the chest wall or the upper abdomen and has the potential to highlight concurrent thrombo-embolic disease. Being done as early as possible, CT may demonstrate the abnormalities at a dose carefully chosen that may be nearby that of a chest X-Ray in specific conditions. It may provide in the same time a guidance for broncho-alveolar lavage or biopsy samples. The differential diagnosis, although being narrowed with CT, remains broad and includes infectious and non infectious disorders, mainly pulmonary hemorrhage, alveolar damage, cardiogenic edema, drug-induced toxicity, radiation pneumonitis, organizing pneumonia, idiopathic pneumonia syndrome, acute cellular rejection or chronic lung allograft dysfunction after lung transplantation, post-transplantation lymphoproliferative disorders or findings related to underlying malignancy. The sensitivity and specificity of the CT halo sign and the air crescent sign suggestive of *Aspergillus* infection in patients with acute leukemia and prolonged neutropenia, and of the CT reverse halo sign and the bird's nest sign, highly suggestive of a mucormycosis in a context of a febrile heavily immunocompromised patient will be discussed. Accurate values of sensitivity and specificity of perfusion measurements assessed by using volume perfusion CT in the distinction between angio-invasive fungal infections and bacterial one in heavily immunocompromised patients with atypical antibiotic-resistant pneumonia remain to definitely establish. Interestingly, Magnetic Resonance Imaging (MRI), a complete radiation-free method, appears to display a high sensitivity in the detection of pulmonary infiltrates compared to HR-CT in neutropenic patients with suspected pulmonary infection and negative chest X-Ray. MRI at 3.0 Tesla has been proven to depict clinically significant pulmonary invasive fungal infections abnormalities with a high accuracy compared to MDCT with sensitivities reaching about 90% for the detection of abnormalities larger than 5 mm. These results, in addition with the increasing potential of the technique with the latest developed sequences, in particular in terms of spatial resolution, should promote its use in the management of this fragile population.