USE OF SPECT CT SCAN IN DIAGNOSING RADIATION INDUCED PULMONARY ARTERY STENOSIS.

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Acute dyspnea, the commonest symptom compelling admission to acute care hospital is also seen in about quarter of patients seeking care in ambulatory settings. Dyspnea as a subjective experience of breathing discomfort that consists of qualitatively distinct sensations that varies in intensity”. This complex subjective symptom indicates threat to critical haemostasis, and predicts adverse outcomes accurately surpassing other objective physiological parameters. The precise identification of the cause of dyspnea can be challenging.

The use of computed tomography of chest (CT Chest) for evaluation of acute dyspnea has increased 5 folds in the last decade, and is the preferred investigation of choice for diagnosing pulmonary embolism (PE), although studies have shown equal efficacy of CT scan and ventilation and perfusion (V/Q) scan. The modern multidetector CT Chest can reliably identify smaller clots even in sub segmental pulmonary arteries and also precisely quantify the right ventricular functions aiding in thrombolytic therapy for PE. However, renal failure limits the use of this test due to risk of contrast induced nephropathy. Planer V/Q scans lack spatial resolution and often reported as indeterminate limiting their widespread application. The addition of single photon emission computer tomography (SPECT) to V/Q scan can overcome this problem and gives excellent anatomical details of lungs leading to growing popularity among physicians. We present a case of radiation induced pulmonary artery stenosis which was accurately identified by SPECT CT scan, missed by CT pulmonary angiogram (CTPA).

Elderly male with stage IIIA lung cancer receiving radiation therapy presented to emergency room with increasing dyspnea over the past 2 weeks. He was tachypnic, tachycardic and hypoxic with elevated BNP and D Dimer levels. CTPA ruled out any pulmonary embolism. Echocardiogram showed peak pulmonary artery systolic pressure of 90 mm of Hg and normal left ventricular functions. His Echocardiogram was normal one year back. Chronic thromboembolic pulmonary hypertension (CTEPH) or pulmonary tumor thrombotic microangiopathy (PTTM) were suspected and V/Q was done. Conventional perfusion scan showed intermediate filling defect in left upper zone (Figure 1) and hence V/Q SPECT CT was done which showed decreased perfusion to left upper lobe (Figure 2). On reviewing the CT scan images, there was evidence of linear radiation fibrosis in left upper lobe with compression of upper lobe pulmonary artery (Figure 3). Patient had received 4600cGY of total planned 6000cGY treatment so far. Based on these findings radiation induced pulmonary artery stenosis was diagnosed.

In animal models, radiation to thorax leads to decreased pulmonary blood flow and cause hypoxia. In humans, this phenomenon has been described in only one case report, although several compilations due to radiation therapy including systemic artery stenosis have been reported before. In normal subjects, planer V/Q scan and CT angiogram are both equally sensitive for the detection of pulmonary embolism, but in the presence of lung fibrosis, V/Q SPECT CT is more sensitive than CT scan and also gives better anatomical details of lung. Hence, in patients with suspected filling defect of pulmonary arteries, V/Q SPECT CT scan offers a unique advantage of better precision without risk of contrast nephropathy.
FIGURES.

Figure 1: Conventional Planer V/Q scan with Xe 133 and Tc99 MAA. Perfusion images shows filling defect in left upper zone.

Figure 2. V/Q SPECT CT perfusion scan showing decreased perfusion to left upper lobe.
Figure 3: MDCT pulmonary angiogram image showing radiation induced fibrosis with compression of upper lobe pulmonary artery (Blue arrow).

REFERENCES