



METHODS OF RADIOLOGICAL INVESTIGATIONS FOR RESPIRATORY SYSTEM

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INTRODUCTION:

Respiratory diseases are multiple origins, Diagnosis and follow up often requires various investigative procedures, which should be applied in an appropriate and cost effective step by step evaluation. Respiratory function testing enables assessment of severity and monitoring of treatment as well as giving diagnostic information. There are numerous imaging techniques are available for examination of Respiratory system. The most appropriate technique is applied according to any given situation.

CHEST RADIOGRAPHY:

X - Ray is an essential part of the diagnostic examination and is the first step in the radiological evaluation of patients with suspected respiratory diseases. It is most frequently requested radiological examination visualization of the lungs is excellent because of the inherent contrast of tissue of the thorax current films is mandatory before proceeding to more complex investigations.

ULTRA SOUND SONOGRAPHY:

Its advantages are lack of radiation low cost and mobility. It is useful only for assessing superficial pulmonary, pleural based and chest wall lesions, it is helpful in the diagnosis and localization of pleural effusions and collections and their image percutaneously, for subphrenic collections, in differentiating fluid from a mass lesion and for studying diaphragm movement. Biopsy of the pleura and chest wall lesions may be performed with USG guidance using a cutting needle. pleural based masses are usually of low echogenicity and pleural thickening is easily identified. If consolidation is visualized fluid filled or air filled bronchi may be seen within it. A special application is endobronchial ultrasound [EBUS]. Which can be used for visualization of mediastinal lymph nodes as well as pulmonary parenchyma lesion and important use is the sampling of EBUS has replaced mediastinoscopy.

CT SCANNING:

It is superior for staging malignancy detecting pulmonary metastases and assessing chest wall and pleural lesion the lung mass, the hilum and mediastinum, high - resolution CT scanning is of proven value in the diagnosis of diffuse lung disease, particularly in the early stages bronchiectasis and surgery is undertaken without preoperative bronchography. The chest radiograph usually reveals the anatomical distribution of lobar or segmental diseases and can demonstrate generalized or diffuse pulmonary parenchymal abnormalities as an alteration in the pattern of pulmonary markings.

High resolution CT [HRCT] can confirm the location extent of disease and can further characterize the location and pattern of disease chest wall involvement by pulmonary pathology may also be demonstrated by CT. Ascertaining the solitary nature of pulmonary

nodule or detection of other unsuspected nodules determination of the probability of malignancy contribution to staging prior to treatment and monitoring of response to treatment are all important role of CT scan is taken in the expiratory phase can be useful in the diagnosis of small airways disease. HRCT may demonstrate sub pleural curvilinear apacities, parenchymal bands, tricked inter and intra lobular lines, increased sub pleural attenuation and honeybombing pleural thickening and asbestos-related pleural disease, pulmonary carcinoma, pleural mesothelioma, Lymphangiitis carcinomatosa, carcinoma alveolar proteinsis, and acute alveolar disease.

TOMOGRAPHY:

It is a useful investigation when CT is unavailable. It is helpful confirming and that it is intrapulmonary. It is still used in assess in a peripheral lung mass the long apices and abnormal hilum. It performs to improve visualization of lesion, to evaluate the hilum and proximal airways search for a suspected lesion eg. Metastases to evaluate the mediastinum and chestwall.

MRI:

The main advantage of MRI includes a multilane facility and high intrinsic soft tissue contrast discrimination allowing vascular structures and lesions in the mediastinal and hilar regions to be defined separately from other tissue, in particular the pulmonary window and subcarinal space, without the need for contrast-medium administration. It has the advantage that radiation is avoided its main indications are visualization of the great vessels and the heart, but it is also useful with suspected tumor invasion of the mediastinum and chestwall.

MRI can be useful in certain situations in the separation of mediastinal masses from normal or abnormal vessels, the illustration of the craniocaudal extent of large lesions and lesions at the lung apex, lung base and chestwall in the evaluation of diaphragmatic hernia. The value of MRI for diagnosing pulmonary disease is still in the assessment stage no distinct advantage over high – resolution CT in the diagnosis of parenchymal disease has yet been shown but it is proven to be helpful in the diagnosis of hilar masses, Lymphadenopathy and mediastinal lesions, and activity of interstitial lung disease.

FLUOROSCOPY:

It is a value for assessing chest wall, diaphragm motion and for demonstrating mediastinal shift in cases of air trapping. It is used mainly for guidance of biopsy of peripheral lung lesions and for differential diagnosis of elevated diaphragm. Screening may be used to differentiate pulmonary from pleural lesions by rotating the patients and noting movement of the lesion with respect to the sternum and spine pulsation is often a misleading sign, it may be transmitted to a mass lying adjacent to a vascular structure. Masses of vascular origin change size with Valsalva maneuver and with patient position. Pulmonary lesions move with respiration whereas mediastinal lesions do not.

BRONCHOSCOPY:

The most important endoscopic method in respiratory medicine is Bronchoscopy for the diagnostic purposes this is almost exclusively performed with a flexible bronchoscope use

video - assisted imaging usually under local anesthetic. It associated very few complications. The procedure not only allow inspection and sampling of the airway, but also facilitates transbronchial needle aspiration [TBNA] from the lymphnodes, sampling material from peripheral lesions with special catheters and brushes or transbrochial lung biopsy [TBLB] by forceps often under guidance of EBUS or fluoroscopy.

Branchography was the definitive investigation for the diagnosis of brochiectasis and for assessing the extent of disease. It is use to investigate recurrent haemoptysis, sever or partial impairments of pulmonary function massive haemoptysis, recent pneumonia, active tuberculosis and history of allergy are recognized contra indications. A more elaborate technique to guide the bronchoscopist to small lesion is electromagnetic navigation.

ANGIOGRAPHY:

Pulmonary and bronchial angiography are invasive techniques for imaging vessels and are only used if less invasive techniques contrast CT/ magnetic resonance imaging MRI fail or need to be confirmed. The main indication is diagnosis of pulmonary embolism, evaluation of pulmonary hypertension and diagnosis of vascular lesion eg pulmonary hypoplasia arieviovenous malformation, pulmonary arteriovenous malformation. It remains gold standard for demonstrate vessels down to the sublegmental level.

NUCLEAR MEDICINE TECHNIQUES:

It includes perfusion and ventilation scintigraphy are manly indicate in diagnosis of pulmonary embolism but also for regional lung function studies eg for predicting post operative lung function before lung surgery. Inhalation scintigraphy can be used to investigate macociliary clearance.

PERCUTONEOUS NEEDLE BIOPSY:

It is mainly performed to investigate peripheral lung lesion when bronchoscopy is negative. It is performing with the guidance of either fluoroscopy or preferably CT. When lesion is adjacent to the chest wall USG guidance can also be used.

THORACENTESIS AND PLEUROSCOPY:

It is frequently performed procedure in pleural effusion preferably use under USG guidance at least when the effusion is small. It may be necessary to confirm or exclude malignant or tuberculosis cause of an effusion.