

# MULTIDETECTOR-ROW CT ANGIOGRAPHY (MEDICAL RADIOLOGY DIAGNOSTIC IMAGING) pdf

## 1: Multidetector-Row Computed Tomography: Scanning and Contrast Protocols - Google Books

*The introduction of multidetector computed tomography (MDCT) is considered a dramatic development in CT imaging that has direct implications in the imaging of various systems, in particular the cardiovascular system.*

Currently computed tomography pulmonary angiography CTPA has become a widely accepted clinical tool in the diagnosis of acute pulmonary embolism PE. MDCT split-bolus results in 40 patients suspicious of PE were analyzed in terms of image quality of target pulmonary vessels TPVs and occurrence and severity of flow-related artifact, flow-related artifact, false filling defect of the pulmonary veins and beam hardening streak artifacts. Dose radiation to patients was calculated. MDCT split-bolus protocol allowed diagnostic images of high quality in all cases. Diagnosis of PE was obtained in 22 of 40 patients. Mean attenuation for target vessels was higher than HU all cases: Adequate enhancement was obtained in the right atrium RA: The flow related artifacts and the beam hardening streak artifacts have been detected respectively in 4 and 25 patients. No false filling defect of the pulmonary veins was revealed. MDCT split-bolus technique by simultaneous opacification of pulmonary arteries and veins represents an accurate technique for diagnosis of acute PE, removes the false filling defects of the pulmonary veins, and reduces flow related artifacts. This is an open-access article distributed under the terms of the Creative Commons Attribution-NonCommercial 4. Despite high sensitivity and specificity, many factors lead to misdiagnosis of PE on CT scan, including patient-related, technical, anatomical and pathological factors 5. When one or more of these factors are revealed e. Optimization of the CTPA protocols is mandatory to obtain an appropriate enhancement of the pulmonary arterial tree to the segmental and subsegmental level and to determine whether PE is present. Split-bolus protocol represents an innovative method of contrast medium injection that involves splitting of a bolus in two or three parts with a variable pause between injections. This protocol has been proposed to obtain a sufficient opacification of the whole aorta and iliac arteries using single slice CT 6. More recently, this protocol was investigated for CT urography, cardiac CT angiography, lung perfusion in pulmonary dual energy CT angiography, pancreatic carcinoma, and detection and characterization of focal liver lesions in oncologic patients 7 - Patients and Methods 3. Patients We retrospectively reviewed section CTPA of 91 patients with clinical suspicion of acute PE at our department in the last 2 years. Other diagnostic tests included plasma D-dimer assay, electrocardiogram, and lower limb ultrasonography. Fifty-one patients with a contraindication to iodinated contrast material use history of allergy and impaired renal function , with hilum or mediastinal enlarged lymph nodes, with pulmonary pathologies that could be a source of artifacts mucus plugs, recent lung cancer surgery, perivascular edema caused by raised atrial pressure, and pacemaker , and with poor image quality were excluded from the study. Of these, 22 patients had a diagnosis of PE. Written informed consent was obtained before MDCT exam in all cases and the information concerning the study population was collected according to the Declaration of Helsinki principles. The duration of data acquisition was seconds. In all patients, the thorax was scanned in a cranio-caudal direction and at end-inspiratory suspension during a single breath hold, resulting in a simultaneous enhancement of the pulmonary arteries and veins. The z-axis coverage and the field of view were chosen to include the entire thorax, from the lung apices to the diaphragm. The resulting images were transferred to an external workstation Advantage Workstation 4. Multiplanar reconstructions were used routinely. Schematic view of detector row CT split-bolus protocol of the chest in an adult male weight 70 kg with clinical suspicion of pulmonary embolism. Contrast material administration is splitted into two boli injections. First bolus [at the start of bolus injection or time zero: The pulmonary peak TPEAK was previously determined with a bolus test injection of 20 mL of contrast material at a rate of 3. A single contrast-enhanced acquisition from lung apices to the diaphragm was acquired resulting in simultaneous contrast enhancement of the pulmonary arteries and veins. Maximum enhancement of the pulmonary arteries was obtained during injection of the second bolus fixed 60 mL of contrast material at a flow rate of 3. Scan delay time TDELAY to establish the pulmonary arteries peak was previously determined

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with a bolus test injection of 20 mL of contrast material at a rate of 3. The transit time ranged between seconds mean 15 seconds. TPEAK is the time to peak of pulmonary arteries predefined with the bolus test minus half the scan duration time TSD of z-axis acquisition coverage. TDELAY includes 6 seconds time to move the scan table to the start of the scan and to give breath-hold instructions to the patient. A single contrast-enhanced acquisition from lung apices to the diaphragm was acquired with a determined time delay from the beginning of contrast material injection, resulting in simultaneous contrast enhancement of the pulmonary arteries and veins. For confident evaluation of acute PE, we considered that the mean attenuation value in the principal pulmonary vessels of greater than HU is the optimal value. The diagnostic criteria of PE by Remy-Jardin et al. The embolisms were categorized as central main, right, and left pulmonary arteries involved to the level of the proximal lobar arteries and peripheral distal lobar, segmental, or subsegmental level. Qualitatively, each observer evaluated the different attenuation within the target pulmonary vessels with a 4-point scale: Quantitatively, each observer placed a circular region of interest ROI on regular transverse sections on each target pulmonary vessels TPVs. ROI size was adjusted to encompass a diameter equal to half the diameter of the artery, avoiding the inclusion of the vessel wall or surrounding structures and the mean attenuation in HU and the standard deviation SD within the regions of interest on three consecutive sections was calculated for each target structure. The criterion used at our institution to define optimal opacification of the pulmonary artery was a value greater than HU. The occurrence and severity of three specific artifacts were assessed: Using a 3 point scale, the observers subjectively rated the occurrence and severity of the aforementioned artifacts. Artifact severity was rated as follows: Any discrepancies concerning the presence or absence of artifacts were resolved by consensus. Radiation Dose Analysis The dosimetric evaluation was carried out by analyzing the split-bolus MDCT examinations of all patients included in the study. Split bolus and standard MDCT technique were compared by examining the effective dose ED; in Sv which was calculated using the following equation. This protocol consisted of unenhanced, arterial and venous phases and was performed with the same scanner Brilliance CT scanner, Philips Healthcare, Netherlands. The duration of data acquisition of the thorax was seconds. Agreement of both reviewers on image quality and severity of flow-related artifact, false filling defect of the pulmonary veins and streak artifacts were assessed with linear weighted kappa statistics. Results The median body weight was 60 kg range, 55 - 71 kg. MDCT with split-bolus protocol allowed diagnostic image of high quality in all cases detecting PE in 22 of 40 patients. The mean attenuation and the medium score subjective image quality analysis in term of degree of CT contrast enhancement TPVs are reported in Table 1. Pulmonary Arteries and Veins:

### 2: CT angiography of the cerebral arteries | Radiology Reference Article | [www.enganchecubano.com](http://www.enganchecubano.com)

*The rationale for incorporating multidetector CT angiography as a useful alternative in the diagnostic algorithm for these patients is explained, along with the CT imaging technique and protocol. The most common CT angiographic imaging findings are reviewed, including active bleeding (blush) and recent bleeding (clots) and their causes.*

### 3: Multidetector-Row CT of the Thorax - Google Books

*Multidetector-row CT has dramatically improved the results of computed tomography in all clinical applications, but its beneficial impact has been most striking in vascular imaging. The simplicity of acquisition and the wide availability of equipment make this modality especially suitable for routine clinical application.*

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