Acute aortic dissection: utilizing imaging modalities to improve detection

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Acute aortic dissection is a serious condition in elderly patients and may become fatal rapidly if left undiagnosed and untreated. As pointed out by Welch et al., chest radiography is a screening test for this condition by detecting these signs such as widening mediastinum, blurring of the aortic knob, left apical cap, etc. Unfortunately these signs on chest radiography may not be sensitive enough to detect acute aortic dissection. Therefore, if patients have high clinical likelihoods of the aortic dissection including old age, crushing chest pain, hypertension, pulse deficit, known history of thoracic aneurysm, or Marfan’s syndrome, etc., further diagnostic test is required to exclude this deadly disease even normal chest radiography. Other imaging modalities include aortography, transesophageal echocardiography (TEE), magnetic resonance imaging (MRI), or computerized tomography (CT). Currently, aortography is not routinely performed to diagnose this condition because it may worse the situation if the catheter is placed into the false lumen. Noninvasive modalities have increasing role because they can detect dissection very accurate and provide the information of the wall and near by structures. This is so important because it has been recognized that acute aortic syndrome is a spectrum of the diseases including acute aortic dissection, penetrating aortic ulcer, intramural hematoma, and aortic rupture. Each imaging modality has strength and weakness for detecting this syndrome. Transesophageal echocardiography provides adequate diagnostic accuracy, evaluates the involvement of aortic valve, determines cardiac function, and importantly can be performed at the bedside in this sick individual, however, the distal part of ascending thoracic aorta and proximal aortic arch area is a blind spot in a number of patients due to the air-filled trachea and left mainstem bronchus interposed between the esophagus and this part of the aorta. The false positive results may be due to reverberation artifacts, calcified plaque, therefore, other imaging modality help to improve the detection if TEE is nondiagnostic. Magnetic resonance imaging is known to be an excellent modality to determine these conditions with high accuracy. The extent of the disease can be completely assessed with MR angiography and cardiac and valve function can be assessed as well. Due to large field of view, the involved surrounding structure and aortic wall can be assessed. Unfortunately, the examination is in a closed space and if patients are in critical condition, it may not be an ideal situation due to safety concern. The MRI examination is contraindicated in patients with cardiac pacemaker, automatic implantable cardioverter-defibrillators, intracranial aneurysm clips, or oto-logic implants, etc. Recently, the development of multidetectors CT scanner allows very fast image acquisition and provides information in aortic pathology, as well as cardiac function and coronary artery disease. Coronary artery involvement from dissection or existing significant coronary arterial stenoses can be determined as well with CT examination. This will improve and shorten diagnostic process and patient may be omitted from diagnostic coronary angiography to exclude significant coronary arterial stenoses prior to surgery if needed. Cardiac CT has been evolving to be utilized for the evaluation of chest pain patients presented in emergency unit because it can detect various causes of chest pain including acute aortic syndrome, coronary artery disease, pulmonary embolism, or pneumothorax, etc. One important limitation is that CT examination requires iodinated contrast which may not be used in some patients who have concomitant renal failure.

Currently, we have several tests to help us to determine acute aortic syndrome and the selection of the test will depend on the patient, concomitant illness, and importantly the local expertise in these modalities. The most important point would be that if patients have high clinical suspicion of acute aortic syndrome, the investigation should not be stopped until it can be confidentially excluded.
References


