Detection of plaque rupture using 64-slice multidetector row computed tomography

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The present case report describes a 37-year-old man who presented to the emergency room with symptoms of a myocardial infarction but no high-grade stenosis on conventional catheter angiography. Consecutive multidetector row computed tomography of the coronary arteries showed an intimal flap along a fibrous plaque formation in the left anterior descending artery. This finding was found to represent a plaque rupture, and the lesion was treated with an 18 mm stent. Multidetector row computed tomography helped to correctly position the stent by identifying the exact location of the rupture along the long plaque formation.

Key Words: Cardiac MDCT; Coronary plaque rupture; 64-slice MDCT

A 37-year-old man presented to the emergency room with thoracic pain and dyspnea. His electrocardiogram (ECG) demonstrated significant ST segment elevation at the anterior wall leads, and later also at the posterior wall leads, and his troponin results were positive. His cardiac-specific creatine kinase levels reached a maximum of 879 U/L. Initial invasive coronary angiography showed a regular contrast media flow (Thrombolysis In Myocardial Infarction [TIMI] grade III flow), with a 50% filling defect in segment 7, but no signs of high-grade stenosis. Because the patient had all the clinical signs of a myocardial infarction but no significant findings on conventional coronary angiography, temporary occlusion of the left anterior descending artery (LAD) was considered to be the working diagnosis, and the patient received abciximab. One day later, another ECG was performed and showed reducing ST elevations. To determine whether the patient needed further coronary intervention, a 64-slice multidetector row computed tomography (MDCT) scan was performed to detect any coronary plaques (1-4). As suspected, the patient suffered from severe one-vessel coronary artery disease (Figure 1). Two mildly stenosing mixed plaques with calcified cores were identified in the LAD, and an intimal flap along a long, stretched, fibrous wall thickening between the two mixed plaques was also visible (Figure 2). Because the intimal flap shown by MDCT correlated well with the filling defect on invasive coronary angiography (in segment 7 of the LAD), a second interventional coronary angiogram was performed to place an 18 mm stent over the ruptured plaque (Figure 3). No cardiac symptoms were reported by the patient following the procedure. Echocardiography results were nonpathological, showing a normal global function without detectable wall motion defects. Three days later, the patient was discharged without pain.

La détection d'une rupture de plaque au moyen d'un tomodensitomètre à 64 coupes

Le présent rapport de cas décrit un homme de 37 ans qui a consulté à l'urgence à cause de symptômes d'infarctus du myocarde sans sténose de haut grade à l'angiographie par cathéter classique. Une tomodensitométrie à 64 coupes des artères coronaires a ensuite révélé un lambeau interne le long d'une formation de plaque fibreuse dans l'artère descendante antérieure gauche. Cette observation représentait une rupture de plaque, et la lésion a été traitée au moyen d'une endoprothèse de 18 mm. La tomodensitométrie à multiples détecteurs a contribué à installer l'endoprothèse correctement en révélant le foyer exact de la rupture le long de la formation de la plaque.

Figure 1) 64-slice multidetector row computed tomography scan of a plaque rupture in the proximal left anterior descending coronary artery in a 37-year-old man. An intimal flap was detected along a fibrous wall thickening (arrowhead) between two mixed plaques with calcified cores (arrows)

DISCUSSION

MDCT is a valid, noninvasive method of evaluating the coronary status of even an unstable patient (5-7). This fast and noninvasive imaging technique may be performed even before magnetic resonance imaging or radionuclide studies, and is less stressful for the patient. MDCT scans may even be performed concurrently with intensive care unit monitoring. The scan is particularly useful in cases of nonconclusive coronary angiography. In these cases, the risk of additional radiation is acceptable, considering the gain of valuable information on the configuration of a plaque and possible significant impact on the

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Figure 2) 64-slice multidetector row computed tomographic depiction of a plaque rupture in the proximal left anterior descending artery. Axial views of two mixed plaques with calcified cores (A and C). B An intimal flap was detected along a fibrous wall thickening in between the two plaques

treatment, as was in the present case. In our case, no cardiologist suspected dissection or intimal flaps while analyzing the first coronary angiography results. Although extra radiation was needed, the MDCT scan was able to identify the cause of the acute coronary syndrome and helped to position the stent most effectively, because whole plaque formation could have had ruptured anywhere.

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Figure 3) 64-slice multidetector row computed tomographic depiction of a plaque rupture (arrowhead) in the proximal left anterior descending coronary artery. A Computed tomographic angiography of the culprit lesion in the left anterior descending coronary artery. B Invasive coronary angiography correlation with a filling defect. C Invasive coronary angiography results after stenting

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