Assessment of no-reflow phenomenon by non-constrast computed tomography in patients with acute myocardial infarction undergoing primary percutaneous coronary angioplasty

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Background: Coronary no-reflow phenomenon after primary percutaneous coronary angioplasty (pPCI) is an independent predictor of adverse clinical outcomes after AMI regardless of infarct size. The incidence of no-reflow varies widely depending on the diagnostic methods used.

Purpose: Showing whether non-contrast CT performed after pPCI might be usefull as a diagnosis of no-reflow phenomenon.

Methods: Six STEMI patients (mean age = 68.3 y/o) underwent revascularization by pPCI and stent placement within 6 hours after onset of angina and within less than 90 minutes of door-to-balloon time. Due to the outbreak of SARS-Cov-2, chest CT scanning was indicated in all patients before coronary unit admission (192 ± 102 mins after pPCI).

Results: Three patients with a higher time than the mean angina time and than the mean door-to-ballon time (190 ± 149.3 versus 170 ± 107.5 and 63 ± 6.08 vs 56 ± 11.5, respectively) developed an interventional type of no-reflow phenomenon (Table 1) and CT scanning showed regional myocardial contrast retention related to the culprit coronary artery (Figure 1). On the other hand, three patients with a lower time than the mean angina time and than the mean door-to-ballon time showed TIMI III flow after pPCI (Table 1) and CT scanning showed no regional myocardial contrast retention (Figure 2).

Conclusion: Myocardial regional contrast retention, evaluated by non-contrast and non-ECG-gated computed tomography after pPCI, might be usefull for no-reflow diagnosis.

TABLE 1

AGE ANGINA-TIME DOOR-TO-BALLON-TIME BASAL/cTnT POST-pPCI/cTnT CHANGE/cTnT

PTS 68 ± 17y/o 170 ± 107mins 56 ± 11mins 1635 ± 2549ng/L 9621 ± 4586ng/L 588%

(N = 6)

NO-REFLOW

PATS 65 ± 25y/o 190 ± 149mins 63 ± 6mins 761 ± 837ng/L 11151 ± 2787ng/L 1465%

(N = 3)

TIMI-III FLOW

PTS 72 ± 9y/o 117 ± 76mins 49 ± 12mins 2219 ± 3653ng/L 18091 ± 6148ng/L 364%
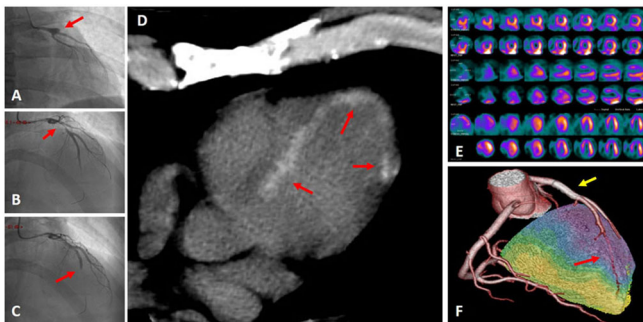
(N = 3)

Abstract Figure 1

FIGURE 1. A 44-year-old male patient presented at the emergency department with an acute anteroseptal ST-segment-elevation myocardial infarction. Invasive coronary angiography (ICA) shows complete occlusion of proximal-LAD (arrow, A). A proximal LAD culprit plaque was demonstrated (arrow, B). However, distal no-reflow (arrow, C) was shown after proximal LAD stenting. Non-contrast and non-ECG-gated chest CT scan obtained 182 minutes after ICA shows a severe contrast retention in apex, septum and anterolateral region (arrows, D) suggesting a poor myocardial reperfusion ("no-reflow phenomenon"). Cardiac SPECT/CT was indicated 3 months later showing a transmural anteroseptal myocardial infarction from ápex-to-mid ventricle with mild ischemia (E), which closely matches contrast retention region at first CT imaging. Hybrid 3D-reconstruction (F) shows patency of the proximal LAD stent (yellow arrow) with severe reduction of distal LAD flow (red arrow).
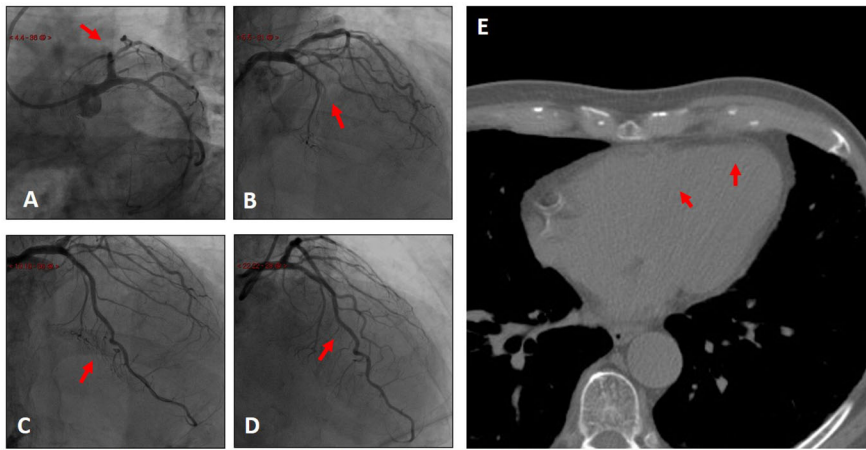
Abstract Figure 2

FIGURE 2. A 81-year-old man presented at the emergency department with an acute anteroseptal ST-segment-elevation myocardial infarction. Invasive coronary angiography (ICA) shows complete occlusion of LAD after first septal branch (arrow, A). A mid-LAD culprit plaque was demonstrated (arrow, B). LAD TIMI III flow was shown after mid LAD stenting (arrows, C and D). Noncontrast and nongated chest CT scan obtained 153 minutes after ICA shows no myocardial contrast retention sugesting complete myocardial reperfusión (arrows, D).