



## The Price of Vigilance—How Often Does a Primary Angioplasty Program Find No Flow-Limiting Coronary Artery Disease to Treat?

**Kalon K.L. Ho, Kevin C. Pachucki, Deana C. Neimann, Kathleen P. Murray, J. Lawrence Mottley, Joseph P. Carrozza, Jr.**  
*Beth Israel Deaconess Medical Center, Boston, Massachusetts*



### Background

- Many hospitals have established primary angioplasty programs with a goal of providing consistently timely reperfusion for patients with acute ST segment elevation myocardial infarction (STEMI).
- As the loci of control for activation of the cardiac catheterization laboratory (CCL) move from cardiologists to the emergency department (ED) and even to pre-hospital activation by emergency medical services, concerns have been raised about “false positive” activations of the primary angioplasty team.

### Objective

- Determine how often flow-limiting coronary artery disease (CAD) was *NOT* found among patients undergoing emergent coronary angiography for suspected acute myocardial infarction (MI)

### Methods

#### Study Venue—Beth Israel Deaconess Medical Center (BIDMC)

- 591 bed urban tertiary academic medical center
- Default reperfusion strategy at all times for patients presenting to the ED with suspected acute MI continues to be emergent coronary angiography and *ad hoc* percutaneous coronary intervention (PCI), if appropriate
- Thrombolytic use only encountered in patients transferred from other hospitals
- As recommended by the D2B Alliance, the BIDMC is in the process of moving the responsibility for activation of the CCL for suspected acute MIs from cardiologists to emergency medicine physicians

#### Data Collection and Definitions

- Data collected as part of participation in the National Cardiovascular Data Registry (NCDR) CathPCI Registry, with additional fields entered into the BIDMC Cardiac Catheterization Laboratory Database
- Data definitions per NCDR CathPCI Registry v2.0c and v3.04
- Coronary artery disease (CAD):  $\geq 50\%$  diameter stenosis in an epicardial coronary artery  $> 2$  mm in diameter

#### Study Population

- Patients undergoing coronary angiography from 22 Apr 2004 - 30 June 2007
- Procedural status coded as
  - Emergent
    - Ongoing ischemic dysfunction, or
    - Cardiogenic shock
  - Salvage
    - Cardiopulmonary resuscitation (CPR) *en route*
- Indication for procedure: suspected acute MI with ST segment elevation, left bundle branch block (LBBB), or electrocardiogram suggestive of acute posterior MI

### Methods (continued)

#### Statistical Methods

- Continuous measures expressed as mean $\pm$ standard deviation and medians, compared using Wilcoxon non-parametric test
- Frequencies compared using Fisher’s exact test and Mantel-Haenszel test for trend
- Statistical analysis performed using SAS v8.02

### Results

Among 980 emergent and salvage cardiac catheterizations, 696 were coronary angiograms for suspected acute STEMI or STEMI equivalents (LBBB, acute posterior MI).

#### Angiographic findings

	<u>n</u>	<u>(%)</u>
– CAD	651	93.5%
– No CAD	45	6.5%

#### Correlates of No CAD

– Age: CAD patients	mean 64.4 $\pm$ 14.0, median 63	p=0.003
– no CAD patients	mean 56.9 $\pm$ 16.5, median 56	
– Gender		
• Male (n=475)	5.3% no CAD	p=0.069
• Female (n=221)	9.1% no CAD	
– Race		
• Caucasian (n=597)	6.0% no CAD	p>0.10
• All others (n=99)	9.1% no CAD	
– Thrombolytic therapy		
• Thrombolytics given (n=20)	15.0% no CAD	p>0.10
• No thrombolytics (n=676)	6.2% no CAD	
– Procedural status		
• Emergent (n=689)	6.5% no CAD	p>0.10
• Salvage (n=7)	0% no CAD	
– Cardiogenic shock		
• Shock present (n=80)	2.5% no CAD	p>0.10
• Shock absent (n=616)	7.0% no CAD	

### Results (continued)

#### Correlates of No CAD (continued)

– Source of patient		
• ED (n=168)	6.6% no CAD	p>0.10
• Inpatient (n=41)	12.2% no CAD	
• Transfer (n=487)	6.0% no CAD	
– Presenting electrocardiogram		
• ST segment elevation (n=675)	6.2% no CAD	p>0.10
• LBBB (n=22)	13.6% no CAD	
• Posterior MI (n=23)	0% no CAD	

#### Temporal Trends

- There were no significant changes in the frequency of no CAD among patients presenting to the ED (by half-year intervals: 5.0%, 12.5%, 9.7%, 6.9%, 0%, 5.0%).

#### Overall Outcomes

	<u>CAD</u>	<u>no CAD</u>	
– In-hospital mortality	6.0%	15.6%	p=0.022
– Coronary artery bypass	5.2%	0%	
– PCI	89.9%	6.7%*	

\* 1 patient: thrombotic 40% stenosis after thrombolytics  
1 patient: spontaneous circumflex dissection, S/P lytics  
1 patient: thrombotic 40% stenosis without thrombolytics

#### Outcomes Among Patients with No CAD (n=45)

	<u>Abnl</u>	<u>NL</u>	<u>N/A</u>
– CK-MB	15	19	11
– Troponin T: $> 0.1$ ng/mL (MI)	19	10	11
– 0.02-0.09 ng/mL	5		
– Wall motion	22	18	5
– Left-sided filling pressures	34	3	8
– Biomarker, wall motion, or filling pressures	40	3	2

Abnl: abnormal; NL: normal; N/A: not assessed

### Limitations

- Unadjudicated data (no angiographic or electrocardiographic core laboratory)
- Only a small portion of the dataset was audited for accuracy and compliance with NCDR CathPCI Registry data definitions.
- Presence of CAD with  $\geq 50\%$  diameter stenosis does not mean that the patient was necessarily suffering an acute MI.
- Some patients with acute MI may have diameter stenosis  $< 50\%$  on the initial angiogram.

### Conclusions

**Among patients undergoing expedited coronary angiography for suspected acute STEMI or STEMI equivalents at the Beth Israel Deaconess Medical Center**

- **87.1% had CAD prompting revascularization**
- **6.5% had CAD not requiring revascularization**
- **0.4% had angiographic evidence of coronary artery disruption with diameter stenosis  $< 50\%$  treated with PCI**
- **5.3% had no CAD (i.e., no diameter stenoses  $\geq 50\%$ ), but elevated biomarkers, wall motion abnormalities, or elevated left-sided filling pressures**
- **0.7% had no CAD (i.e., no diameter stenoses  $\geq 50\%$ ) and no documented abnormalities in biomarkers, wall motion, or left-sided filling pressures**

- **Our current strategy for activating the primary angioplasty team resulted in few truly “false positive” procedures**
- **Mimics of STEMI with demonstrable cardiac abnormalities were not infrequent**