Sex Differences In Door To Electrocardiogram and Balloon Times In Patients With ST Segment Elevation Myocardial Infarction

Nathan Spence, MD, Janice Muratori, RN, Steven E. Reinert, MS, Barry L. Sharaf, MD, and J. Dawn Abbott, MD

Approximately 500,000 ST-elevation myocardial infarctions (STEMI) occur each year in the US. The American College of Cardiology/American Heart Association guidelines recommend that a 12-lead electrocardiogram (ECG) be obtained in the Emergency Department (ED) within ten minutes of arrival for all patients presenting with chest pain or symptoms suggestive of acute coronary syndrome (ACS). The ten minute door-to-ECG (DTE) standard is particularly important in STEMI patients, as delays beyond this interval are associated with prolonged time to reperfusion and an increased mortality.

Prior studies have reported sex-based disparities in cardiac care, including delays in obtaining ECGs and initiating treatment, in the setting of chest pain and ACS. Delays observed in women have been attributed to the frequency of atypical clinical presentations and physician bias among other theories. The primary purpose of our study, therefore, was to examine the relationship between sex and DTE times in the highest risk subset of ACS patients, those with STEMI, and secondarily to assess DTB times.

Methods

Study design and setting

This was a retrospective study of consecutive patients admitted through the ED at Rhode Island Hospital, an urban Level I trauma and tertiary care center in Providence, RI. The ED has a census of approximately 100,000 adult visits annually. The hospital has a 24-hour primary PCI program with a catheterization laboratory in the ED. Care is documented in an electronic medical record system. A database is maintained for all patients diagnosed with STEMI. The dataset includes the following times: triage, ECG, catheterization lab activation, lab staff availability, patient in lab, and reperfusion. In addition, it is recorded whether the patient was transferred from another institution, had a pre-hospital ECG transmitted, had ST elevation present on the initial ECG, and had shock or cardiac arrest. A research coordinator verified all data by independent review of the medical record. Medical history, presenting symptoms, and mode of arrival were obtained from chart review. The Institutional Review Board approved the protocol.

Study Population

All patients presenting with a diagnosis of STEMI who were taken to the cardiac catheterization lab January 1st, 2008 through December 31st, 2010 were included. The initial sample consisted of 440 males and 142 females. Patients were excluded if they met the following criteria: they were transferred from an outside medical facility, had a pre-hospital ECG showing ST elevations, initial ECG time was unavailable, the initial ECG did not show ST elevation, or mode of transportation was not documented. The final patient population was 197 patients (150 male, 47 female).

Statistical Analysis

The primary outcome measure was DTE, calculated from the triage time and first ECG time. The secondary outcome measure was DTB time, determined by subtracting time of arrival from the first intra-coronary device time. Baseline variables and outcomes were analyzed according to sex using the independent-samples t-test (with adjustment for unequal variance where appropriate). We used the Pearson correlation coefficient for gauging the strength of the relationship among time variables, age, and DTB. We used an alpha probability of 0.05 as the threshold for statistical significance in two-tailed comparisons. Means are presented with standard deviations throughout. All statistics were performed with Stata v.10 (Stata Corp., College Station, TX).

Results

Baseline characteristics

197 patients met study eligibility criteria. Baseline characteristics according to sex are displayed in Table 1. Women were older; more often diabetes, and were less likely to have prior CAD. Presence of chest pain and mode of arrival were similar.

Diagnosis and treatment times

The mean DTE time was similar in women and men (eight minutes versus seven minutes, p=0.25). 81% of women and 79% of men had DTE within the ten minute guideline recommendation.
of patients with atypical symptoms of ACS received a timely ECG and patients arriving by ambulance had significantly shorter ECG times than walk-ins.8

While it did not reach statistical significance, the sex difference in DTB of almost nine minutes we observed between women and men may be clinically important. The study, however, was not powered to assess clinical outcomes. Previous studies have reported delays in time to reperfusion in women with STEMI with higher adjusted mortality compared to men.10 Our study suggests that the difference in DTB time is not related to a delay in diagnosis and further investigation into factors that may delay reperfusion such as obtaining arterial access or angiography are warranted and may identify additional targets to further improve care in STEMI patients.

LIMITATIONS

Our study is limited by it being a single site at an academic urban medical center and results may not be generalizable to other institutions. Our hospital has a multidisciplinary DTB time quality improvement team comprised of representatives from the ED, interventional cardiology, cath lab, and hospital. An internal monitoring system to track DTB times has been in place since 2005 and all cases that fall outside the guideline times are reviewed. The results, therefore, may not be observed in hospitals with less organized or successful primary PCI programs. The presence of the cath lab in the ED also facilitates rapid DTB times. An additional limitation is the relatively small sample size. It is possible that statistically significant differences would be found in a larger patient population.

CONCLUSIONS

In a primary PCI program where the majority of patients receive guideline recommended care we did not observe differences in the diagnosis or treatment of STEMI according to sex. This suggests that ED and hospital protocols for evaluating high-risk ACS patients work effectively in both women and men.

REFERENCES


Nathan Spence, MD, is an Internal Medicine Resident, Department of Medicine, Rhode Island Hospital.

Janice Muratori, RN, is a Research Coordinator in the Cardiac Project Office at Rhode Island Hospital.

Steven E. Reinert, MS, is a Research Analyst, Department of Information Services, Lifespan.

Barry L. Shanaf, MD, is Director of the Cardiac Catheterization Laboratory, Associate Professor, Department of Medicine, Rhode Island Hospital.

J. Dawn Abbott, MD, is Director of the Interventional Fellowship, Associate Professor, Department of Medicine, Rhode Island Hospital.

Disclosure of Financial Interests

The authors and/or their spouses/significant others have no financial interests to disclose.

Correspondence

J. Dawn Abbott, MD
Rhode Island Hospital
814 APC, 593 Eddy St.
Providence, RI 02903
phone: (401) 444-4581
fax: (401) 444-8158
e-mail: jabbott@lifespan.org