

PUBLISHED ABSTRACT

Managing Patients with ST – Elevation Myocardial Infarction at the Epicenter of the COVID-19 Pandemic

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Background

Globally there have been reports of decreased STEMI volumes during the COVID-19 pandemic and as a result of strained acute care resources, the potential for rapid clinical decompensation, and concerns about staff safety, a conservative management approach for ACS patients has been recommended.

Hypothesis

This study aimed to investigate the incidence of STEMI at the epicenter of COVID-19 pandemic and compare outcomes of invasive versus conservative treatment strategies.

Methods

Patients presenting with STEMI to Elmhurst Hospital Center in Elmhurst, New York during the COVID-19 era from March 1–April 30, 2020 were evaluated. Only patients that tested positive for COVID-19 were included for analysis. Patients were managed with either primary percutaneous coronary intervention or medical management. Demographics and outcomes of patients treated invasively and conservatively were compared and of survivors and nonsurvivors during the study period.

Results

In the public hospital system serving the community most impacted by the COVID-19 pandemic in the U.S. to date, the monthly STEMI volume was similar to that during the comparable period a year earlier, likely a result of socioeconomic factors and patient demographics of the Queens population, in contrast to reports of diminished volumes in other healthcare systems, including corporate hospitals in New York City. Twelve COVID-19 positive patients presented with STEMI during the study period. Eight patients underwent coronary angiography and were treated with primary PCI, the remainder were managed conservatively with medical therapy as these patients either presented >24 hours after the onset of symptoms or recognition of ACS was delayed after hospital admission. All 4 had signs of ARDS and required endotracheal intubation on the day of STEMI diagnosis. Among the total cohort, mortality was 42%, 25% in those undergoing primary PCI, and 75% in those managed without PCI. Nonsurvivors were older, had higher inflammatory markers and peak troponin levels and more often had bilateral pulmonary infiltrates (**Table 1**).

Table 1: Characteristics of 12 STEMI COVID-19 Positive Patients.

| | Total N = 12 | Primary PCI N = 8 | Conservative Management N = 4 | Survivors N = 7 | Nonsurvivors N = 5 |
|--------------------------------|-----------------|----------------------|----------------------------------|--------------------|-----------------------|
| Mean age (range) | 60.6 (22–78) | 60.4 (22–78) | 61 (37–76) | 54 (22–74) | 69.8 (64–78) |
| Male sex – no (%) | 9 (75) | 6 (75) | 3 (75) | 6 (86) | 3 (60) |
| BMI – no (range) | 28.6 (21–43) | 30 (21–43) | 26 (21–29) | 31 (21–43) | 26 (20–29) |
| Race/Ethnicity – no (%) | | | | | |
| White (Eastern European) | 3 (25) | 3 (37.5) | 0 | 2 (29) | 1 (20) |

(Contd.)

| | Total N = 12 | Primary PCI N = 8 | Conservative Management N = 4 | Survivors N = 7 | Nonsurvivors N = 5 |
|--|-------------------------|------------------------------|--|----------------------------|-------------------------------|
| Black | 1 (8) | 1 (12.5) | 0 | 1 (14) | 0 |
| Hispanic | 5 (42) | 3 (37.5) | 2 (50) | 3 (43) | 2 (40) |
| East Asian | 2 (17) | 0 | 2 (50) | 0 | 2 (40) |
| Bengali | 1 (8) | 1 (12.5) | 0 | 1 (14) | 0 |
| Risk Factor – no (%) | | | | | |
| Hypertension | 6 (50) | 5 (63) | 1 (25) | 4 (57) | 2 (40) |
| Diabetes | 4 (33) | 3 (38) | 1 (25) | 2 (29) | 2 (40) |
| Mean A1c % | 6 | 6 | 6.1 | 6.1 | 6 |
| Hyperlipidemia | 7 (59) | 5 (63) | 2 (50) | 3 (43) | 4 (80) |
| Mean LDL mg/dL (range) | 110 (50–166) | 111 (50–166) | 107 (58–141) | 113 (79–166) | 105 (50–141) |
| Tobacco Use (current or former) | 3 (25) | 3 (38) | 0 | 3 (43) | 0 |
| History of lung disease | 1 (8) | 0 | 1 (25) | 0 | 1 (20) |
| Chronic Kidney Disease | 0 | | | | |
| Established Coronary Artery Disease (CAD)* | 1 (8) | 1 (12.5) | 0 | 1 (14) | 0 |
| Symptoms at time of STEMI | | | | | |
| Chest pain | 12 (100) | 8 (100) | 4 (100) | 7 (100) | 5 (100) |
| Shortness of breath | 6 (50) | 1 (12.5) | 4 (100) | 2 (29) | 4 (80) |
| Cough | 3 (25) | 0 | 3 (75) | 1 (14) | 2 (40) |
| Fever/myalgia | 5 (42) | 2 (25) | 3 (75) | 3 (43) | 2 (40) |
| Cardiac arrest/ shock | 0 | | | | |
| Electrocardiographic Location of ST Segment Elevation | | | | | |
| Anterior | 5 (42) | 4 (50) | 1 (25) | 3 (43) | 2 (40) |
| Lateral | 1 (8) | 1 (12.5) | 0 | 0 | 1 (20) |
| Inferior | 6 (50) | 3 (37.5) | 3 (75) | 4 (57) | 2 (40) |
| Time of STEMI EKG from symptom onset | | | | | |
| <4 hours | 5 (42) | 5 (62.5) | 0 | 3 (43) | 2 (40) |
| 4–12 hours | 1 (8) | 1 (12.5) | 0 | 1 (14) | 0 |
| 12–24 hours | 1 (8) | 1 (12.5) | 0 | 1 (14) | 0 |
| >24 hours | 5 (42) | 1 (12.5) | 4 (100) | 2 (29) | 3 (60) |
| CXR at time of STEMI | | | | | |
| Bilateral infiltrates | 6 (50) | 2 (16) | 4 (100) | 2 (60) | 4 (80) |
| Unilateral infiltrates | 0 | | | | |
| Clear | 6 (50) | 6 (75) | 0 | 5 (71) | 1 (20) |
| Laboratory Data† | | | | | |
| Initial Troponin T ng/dL | 0.7 (0–2.7) | 0.5 (0–2.7) | 1 (0–2) | 0.6 (0–2.7) | 0.8 (0–2) |

(Contd.)

| | Total N = 12 | Primary PCI N = 8 | Conservative Management N = 4 | Survivors N = 7 | Nonsurvivors N = 5 |
|--|-------------------------|------------------------------|--|----------------------------|-------------------------------|
| Peak Troponin T | 8.8 (1.3–22.5) | 10.3 (1.3–22.5) | 5.8 (2.7–10.23) | 7.7 (1.3–18.1) | 10.4 (4.4–22.5) |
| Peak CRP mg/L | 173.7 (3.2–300) | 111.3 (3.2–225.2) | 298.5 (294–300) | 114.2 (3.2–300) | 257.1 (190.5–300) |
| Peak D-Dimer ng/mL | 7031 (150–48,648) | 1264 (150–3190) | 18,566 (2272–48,648) | 1967 (150–6202) | 14,121 (376– 48,648) |
| White Blood Cell Count × 10 ³ /mcl | 14.5 (9–26) | 13.8 (9–26) | 16 (11–23) | 12.7 (9–22) | 17.1 (11–26) |
| Absolute Lympho- cyte Count × 10 ³ /mcl | 1.5 (0.7–3.4) | 1.8 (0.7–3.4) | 0.8 (0.6–0.9) | 1.9 (0.7–3.4) | 0.8 (0.6–0.9) |
| Echo findings | | | | | |
| Regional wall motion abnormalities | 12 (100) | | | | |
| Ejection Fraction ≤ 40% | 7 (58) | 5 (62.5) | 2 (50) | 5 (71) | 2 (40) |
| Ejection Fraction >40% | 5 (42) | 3 (37.5) | 2 (50) | 2 (29) | 3 (60) |
| Therapies | | | | | |
| Antiplatelet Agent | 12 (100) | | | | |
| Anticoagulation | 12 (100) | | | | |
| Statin | 11 (92) | 8 (100) | 3 (75) | 7 (100) | 4 (80) |
| Azithromycin | 5 (42) | 2 (25) | 3 (75) | 1 (14) | 4 (80) |
| Plaquenil | 5 (42) | 2 (25) | 3 (75) | 1 (14) | 4 (80) |
| Outcomes | | | | | |
| Mechanical ventilation | 5 (42) | 1 (12.5) | 4 (100) | 1 (14) | 4 (80) |
| Renal replacement strategy | 2 (17) | 1 (12.5) | 1 (25) | 1 (14) | 1 (20) |
| Hospital Discharge | 6 (50) | 6 (75) | | | |
| In-hospital death | 5 (42) | 2 (25) | 3 (75) | | |
| CCU length of stay (days) | 8.3 (3–22) | 6.6 (3–17) | 11.5 (4–22) | 7 (3–9) | 11 (2–22) |

Conclusions

Patients in whom cardiac symptoms predominate, with or without other manifestations of COVID-19 illness who presented early and were managed with an invasive strategy, with appropriate precautions, enjoyed more favorable outcomes. Accordingly, our experience supports an individualized clinical assessment rather than a uniform approach in this challenging era.

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