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Comparison of Coronary Artery Involvement and Mortality in STEMI Patients With and Without SARS-CoV-2 During the COVID-19 Pandemic: A Systematic Review and Meta-Analysis

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Abstract: Background: Cardiovascular injury with SARS-CoV-2 infection is well known. Several studies have outlined baseline characteristics in patients presenting with STEMI and SARS-CoV-2. Paucity in data exists in selective coronary involvement in patients with STEMI and SARS-CoV-2 during the COVID-19 pandemic.

Methods: A systematic search and meta-analysis of studies meeting the inclusion and exclusion criteria obtained from MEDLINE, Scopus, and Cochrane databases was performed utilizing PRISMA criteria. The main outcome was likelihood of coronary artery involvement among patients with STEMI and

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https://doi.org/10.1016/j.cpcardiol.2021.101032
SARS-CoV-2 versus without SARS-CoV-2. The primary adverse outcome measured was in-hospital mortality.

**Results:** The final analysis included 5 observational studies with a total of 2,266 patients. There was no statistical significance in LM (OR 1.40; 95% CI: 0.68, 2.90), LAD (OR 1.09; 95% CI 0.83, 1.43), LCX (OR 1.17; 95% CI: 0.75, 1.85), or RCA (OR 0.59; 95% CI: 0.30, 1.17) disease among the 2 groups. LAD disease was the most prevalent coronary involvement among patients with STEMI and SARS-CoV-2 (49.6%). Higher in-hospital mortality was observed in the STEMI and SARS-CoV-2 group (OR 5.24; 95% CI: 3.63, 7.56).

**Conclusions:** Our analysis demonstrated no statistical significance in selective coronary involvement in patients with STEMI and SARS-CoV-2 during the COVID-19 pandemic. The higher mortality among patients with SARS-CoV-2 and STEMI has been noted in prior studies with concerns being late presentation due to fear of infection, delayed care time, and poor resource allocation. Focus should be placed on identifying and managing comorbidities to reduce mortality. (Curr Probl Cardiol 2022;47:101032.)

**Abbreviations:** (SARS-CoV-2), severe acute respiratory syndrome coronavirus 2; (COVID-19), coronavirus disease 2019; (STEMI), ST segment elevation myocardial infarction; (PRISMA), Preferred Reporting Items for Systematic Reviews and Meta-Analyses; (OR), odds ratio; (LM), left main; (LAD), left anterior descending; (LCX), left circumflex; (RCA), right coronary artery; (CAD), coronary artery disease

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**Introduction**

The first reported cases of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was in December 2019 in Wuhan, China. Since then, as of August 26, 2021 there are over 213 million confirmed cases worldwide, increasing our knowledge of the coronavirus disease 2019 (COVID-19) pandemic. The interplay between prior cardiovascular disease and severity of SARS-CoV-2 infection, as well as myocardial injury from the virus has been described. Most notably, the hypercoagulable nature of the virus has been of growing interest with particular focus on the prothrombotic effects on vasculature. Aside from the
biological interplay of the disease, appreciation in the decline of hospital admissions for acute coronary syndrome during the COVID-19 pandemic has been well noted.\textsuperscript{5} There have been several studies evaluating baseline characteristics and outcomes of patients presenting with ST segment elevation myocardial infarction (STEMI) during the pandemic in comparison to pre-pandemic times.\textsuperscript{6-9} To better understand the presentation of STEMI patients who have SARS-CoV-2, our study sought to address the paucity in data that exists in outcomes of selective coronary involvement in patients presenting with STEMI and SARS-CoV-2 in comparison to those without SARS-CoV-2 during the COVID-19 pandemic.

**Methods**

We utilized the Medline, Scopus, and Cochrane databases to perform a systematic search adhering as closely as possible to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines\textsuperscript{10} (Table 1). Keywords utilized in the search were “STEMI” AND “COVID-19.” We included studies that evaluated patients presenting with acute STEMI and were positive for SARS-CoV-2. Studies should have reported clinical presentation, coronary involvement, and outcomes of patients with versus without SARS-CoV-2 during the COVID-19 pandemic. We included all studies irrespective of their design. We only included studies in the English language. Studies excluded were those which lacked details of coronary artery involvement, did not assess in-hospital mortality, or that compared populations that were pre-COVID-19 pandemic. The main outcome of our study was likelihood of coronary artery involvement among patients with STEMI and SARS-CoV-2 versus without SARS-CoV-2. The primary adverse outcome measured was in-hospital mortality. Heterogeneity was presumed and bias was not assessed due to observational nature of the studies. This study was not registered, and review protocol was not created.

The statistical methods implemented for our analysis was the Cochran-Mantel-Haenszel test with the random effect analysis model. Odds ratio (OR) was used as the effect measure. To perform statistical analysis, we utilized the RevMan 5.0 software (Cochrane Collaboration, Oxford, United Kingdom).

**Results**

Our search initially resulted in a total of 734 results. After implementation of our analysis criteria, 5 studies were included\textsuperscript{11-15} (Fig 1). All studies
| Section and Topic | Item # | Checklist item                                                                 | Location where item is reported |
|-------------------|--------|--------------------------------------------------------------------------------|---------------------------------|
| **TITLE**         | Title  | **Identify the report as a systematic review.**                                 | Page 1                          |
| **ABSTRACT**      | Abstract | **See the PRISMA 2020 for Abstracts checklist.**                               | Page 1-2                        |
| **INTRODUCTION**  | Rationale | **Describe the rationale for the review in the context of existing knowledge.** | Page 2-3                        |
| **METHODS**       | Objectives | **Provide an explicit statement of the objective(s) or question(s) the review addresses.** | Page 2-3                        |
| Eligibility criteria | 5 | **Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.** | Page 3                          |
| Information sources | 6 | **Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.** | Page 3                          |
| Search strategy | 7 | **Present the full search strategies for all databases, registers and websites, including any filters and limits used.** | Page 3                          |
| Selection process | 8 | **Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.** | Page 3                          |
| Data collection process | 9 | **Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.** | Not Applicable                  |
| Data items        | 10a | **List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.** | Page 3                          |
|                    | 10b |                                                                                  |                                 |

(continued on next page)
**Table 1. (continued)**

| Section and Topic       | Item # | Checklist item                                                                                                                                                                                                 | Location where item is reported |
|-------------------------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
|                         | 11     | Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process. | Page 3                          |
| Effect measures         | 12     | Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.                                                                            | Page 3                          |
| Synthesis methods       | 13a    | Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)). | Page 3                          |
|                         | 13b    | Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.                                                        | Not Applicable                   |
|                         | 13c    | Describe any methods used to tabulate or visually display results of individual studies and syntheses.                                                                                                | Page 3                          |
|                         | 13d    | Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used. | Page 3                          |
|                         | 13e    | Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).                                                                     | Not Applicable                   |
|                         | 13f    | Describe any sensitivity analyses conducted to assess robustness of the synthesized results.                                                                                                               | Not Applicable                   |
| Reporting bias assessment | 14    | Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).                                                                                     | Page 3                          |
| Certainty assessment    | 15     | Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.                                                                                                       | Not Applicable                   |
| RESULTS                 | 16a    |                                                                                                                                                                                                           | Page 3, 8-10                     |

(continued on next page)
| Section and Topic | Item # | Checklist item | Location where item is reported |
|-------------------|--------|----------------|---------------------------------|
| Study characteristics | 16b    | Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded. | Page 3, 8-10 |
|                   | 17     | Cite each included study and present its characteristics. | Page 3, 8-10 |
| Risk of bias in studies | 18     | Present assessments of risk of bias for each included study. | Page 3, 8-10 |
| Results of individual studies | 19     | For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots. | Page 3, 8-10 |
| Results of syntheses | 20a    | For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies. | Page 3, 8-10 |
|                    | 20b    | Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect. | Page 3, 8-10 |
|                    | 20c    | Present results of all investigations of possible causes of heterogeneity among study results. | Page 3, 8-10 |
|                    | 20d    | Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results. | Not Applicable |
| Reporting biases | 21     | Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed. | Page 3, 8-10 |
| Certainty of evidence | 22     | Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed. | Not Applicable |
| DISCUSSION | 23a    | Provide a general interpretation of the results in the context of other evidence. | Page 10-12 |

(continued on next page)
Table 1. (continued)

| Section and Topic | Item # | Checklist item                                                                 | Location where item is reported |
|-------------------|--------|--------------------------------------------------------------------------------|---------------------------------|
| 23b               |        | Discuss any limitations of the evidence included in the review.                 | Page 10-12                      |
| 23c               |        | Discuss any limitations of the review processes used.                            | Page 10-12                      |
| 23d               |        | Discuss implications of the results for practice, policy, and future research.   | Page 10-12                      |
| OTHER INFORMATION |        |                                                                                  |                                 |
| Registration and protocol | 24a | Provide registration information for the review, including register name and registration number, or state that the review was not registered. | Page 3                          |
|                    | 24b   | Indicate where the review protocol can be accessed, or state that a protocol was not prepared. | Page 3                          |
|                    | 24c   | Describe and explain any amendments to information provided at registration or in the protocol. | Not Applicable                   |
| Support            | 25    | Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review. | Page 1                          |
| Competing interests| 26    | Declare any competing interests of review authors.                               | Page 1                          |
| Availability of data, code and other materials | 27  | Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review. | Page 1-12                        |

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71
For more information, visit: http://www.prisma-statement.org/
were observational in nature. Choudry et al was a single center study located in London, England that occurred between March 1 and May 20, 2020.\textsuperscript{11} Kiris et al examined data from 15 centers in Turkey from March 11-May 15, 2020.\textsuperscript{12} Koutsoukis et al examined data from 5 university hospitals across France from April 1-22, 2020.\textsuperscript{13} Marfella et al was a multicenter cohort study across Italy from February 20-November 2020. Their study looked specifically at asymptomatic SARS-CoV-2 patients with STEMI versus SARS-CoV-2 negative patients.\textsuperscript{14} Rodriguez-Leor et al, examined data from 42 hospitals that were part of the Spanish Infarct Code Registry from March 14-April 30, 2020.\textsuperscript{15} In total, there were 2,266 patients with 266 patients with STEMI and SARS-CoV-2 and 2,000 patients with STEMI but without SARS-CoV-2. Baseline characteristics of studies included can be found in (Table 2).\textsuperscript{11-15} In summary, the average age of patients with STEMI and SARS-CoV-2 was 62.4 years with a male predominance. The most common medical comorbidity was hypertension.

\textbf{Fig 1.} Selection PRISMA flow.
Smokers accounted for nearly 27% of the population. The average age of patients with STEMI without SARS-CoV-2 was 63.9 years with a male predominance. The most common medical comorbidity was hypertension. Smokers accounted for nearly 40% of the population. In both groups analyzed, females were presumed to be the remaining sample size if not specified.

All 5 studies were included in the meta-analysis. For left main (LM) artery disease there were 4.7% of STEMI patients with SARS-CoV-2 and 2.5% without SARS-CoV-2. There was no statistically significant difference in the likelihood of LM involvement among patients with SARS-CoV-2 versus without (OR 1.40; 95% Confidence Interval 0.68, 2.90). For left anterior descending (LAD) artery disease there were 49.6% of STEMI patients with SARS-CoV-2 and 44.9% without SARS-CoV-2. There was no statistically significant difference in the likelihood of LAD involvement among patients with SARS-CoV-2 versus without (OR 1.09; 95% Confidence Interval 0.83, 1.43). For left circumflex (LCX) artery disease there were 15.5% of STEMI patients with SARS-CoV-2 and 16% without SARS-CoV-2. There was no statistically significant difference in the likelihood of LCX involvement among patients with SARS-CoV-2 versus without (OR 1.17; 95% Confidence Interval 0.75, 1.85). For right coronary artery (RCA) disease there were 25.2% of STEMI patients with SARS-CoV-2 and 33.8% without SARS-CoV-2. There was no statistically significant difference in the likelihood of RCA

| Study            | Mean Age (years) | Males | Females | Prior CAD | DM | HTN | HLD | Smoking |
|------------------|------------------|-------|---------|-----------|----|-----|-----|---------|
| Choudry et al    | 61.7             | 33    | 6       | 6         | 18 | 28  | 24  | 24      |
| Kiris et al      | 66.8             | 44    | 21      | 12        | 18 | 31  | NA  | 22      |
| Koutsoukis et al | 62.7             | 19    | 7       | NA        | 14 | 15  | 11  | 5       |
| Marfella et al   | 56.1             | 31    | 15      | NA        | 8  | 18  | 7   | 3       |
| Rodriguez-Leor et al | 64.8        | 76    | 14      | 14        | 21 | 47  | 44  | 17      |

A) Baseline Characteristics of Patients With SARS-CoV-2

Abbreviations: Coronary Artery Disease (CAD), Diabetes Mellitus (DM), Hypertension (HTN), Hyperlipidemia (HLD), Not available (NA)

| Study            | Mean Age (years) | Males | Females | Prior CAD | DM | HTN | HLD | Smoking |
|------------------|------------------|-------|---------|-----------|----|-----|-----|---------|
| Choudry et al    | 61.7             | 57    | 19      | 3         | 20 | 32  | 28  | 35      |
| Kiris et al      | 60               | 526   | 142     | 81        | 193| 278 | NA  | 222     |
| Koutsoukis et al | 67               | 144   | 67      | NA        | 54 | 102 | 79  | 67      |
| Marfella et al   | 68.4             | 86    | 44      | NA        | 38 | 72  | 30  | 39      |
| Rodriguez-Leor et al | 62.5        | 717   | 198     | 119       | 192| 489 | 429 | 415     |

B) Baseline Characteristics of Patients Without SARS-CoV-2

Abbreviations: Coronary Artery Disease (CAD), Diabetes Mellitus (DM), Hypertension (HTN), Hyperlipidemia (HLD), Not available (NA)
involvement among patients with SARS-CoV-2 versus without (OR 0.59; 95% Confidence Interval 0.30, 1.17). There was a total of 57 deaths (22.1%) in STEMI patients with SARS-CoV-2 and 110 (5.8%) deaths in patients without SARS-CoV-2. There was a statistical significance in

### Comparison of Left Main Artery Disease in STEMI Patients with and without SARS-CoV-2 Infection

| Study or Subgroup | SARS-CoV-2 Events | SARS-CoV-2 Negative Events | Total Events | Weight | Odds Ratio M-H, Random, 95% CI | Weight | Odds Ratio M-H, Random, 95% CI |
|-------------------|-------------------|---------------------------|-------------|--------|--------------------------------|--------|--------------------------------|
| Chudry 2020       | 2                 | 1                         | 3           | 6.9%   | 4.05 [0.36, 46.17]            | 4.05   | 4.05 [0.36, 46.17]            |
| Kini 2021         | 1                 | 1                         | 2           | 17.7%  | 2.64 [0.78, 14.94]            | 2.64   | 2.64 [0.78, 14.94]            |
| Koutrasou 2020    | 0                 | 1                         | 1           | 5.0%   | 1.00 [0.07, 17.94]            | 1.00   | 1.00 [0.07, 17.94]            |
| Marfella 2021     | 8                 | 15                        | 23          | 60.6%  | 1.61 [0.63, 4.16]             | 1.61   | 1.61 [0.63, 4.16]             |
| Rodriguez-Leor 2021 | 1               | 15                        | 16          | 12.7%  | 0.67 [0.59, 1.13]             | 0.67   | 0.67 [0.59, 1.13]             |
| Total (95% CI)    | 258               |                            |             |        | 1.40 [0.68, 2.90]             | 1.40   | 1.40 [0.68, 2.90]             |
| Test for overall effect: Z = 0.91 (P = 0.36) |                  |                           |             |        |                                |        |                                |

### Comparison of Left Anterior Descending Artery Disease in STEMI Patients with and without SARS-CoV-2 Infection

| Study or Subgroup | SARS-CoV-2 Events | SARS-CoV-2 Negative Events | Total Events | Weight | Odds Ratio M-H, Random, 95% CI | Weight | Odds Ratio M-H, Random, 95% CI |
|-------------------|-------------------|---------------------------|-------------|--------|--------------------------------|--------|--------------------------------|
| Chudry 2020       | 22                | 41                        | 63          | 12.3%  | 1.10 [0.51, 2.40]             | 1.10   | 1.10 [0.51, 2.40]             |
| Kini 2021         | 25                | 77                        | 102         | 27.1%  | 0.86 [0.51, 1.44]             | 0.86   | 0.86 [0.51, 1.44]             |
| Koutrasou 2020    | 5                 | 38                        | 43          | 3.8%   | 0.67 [0.22, 2.03]             | 0.67   | 0.67 [0.22, 2.03]             |
| Marfella 2021     | 31                | 46                        | 77          | 14.8%  | 1.56 [0.77, 3.17]             | 1.56   | 1.56 [0.77, 3.17]             |
| Rodriguez-Leor 2021 | 45           | 141                       | 186         | 39.3%  | 1.19 [0.78, 1.84]             | 1.19   | 1.19 [0.78, 1.84]             |
| Total (95% CI)    | 258               |                            |             |        | 0.90 [0.83, 1.43]             | 0.90   | 0.90 [0.83, 1.43]             |
| Test for overall effect: Z = 0.55 (P = 0.58) |                  |                           |             |        |                                |        |                                |

### Comparison of Left Circumflex Artery Disease in STEMI Patients with and without SARS-CoV-2 Infection

| Study or Subgroup | SARS-CoV-2 Events | SARS-CoV-2 Negative Events | Total Events | Weight | Odds Ratio M-H, Random, 95% CI | Weight | Odds Ratio M-H, Random, 95% CI |
|-------------------|-------------------|---------------------------|-------------|--------|--------------------------------|--------|--------------------------------|
| Chudry 2020       | 4                 | 1                         | 5           | 4.0%   | 8.57 [0.82, 79.53]            | 8.57   | 8.57 [0.82, 79.53]            |
| Kini 2021         | 15                | 139                       | 154         | 33.5%  | 1.38 [0.73, 2.59]             | 1.38   | 1.38 [0.73, 2.59]             |
| Koutrasou 2020    | 4                 | 19                        | 23          | 12.6%  | 1.30 [0.36, 4.42]             | 1.30   | 1.30 [0.36, 4.42]             |
| Marfella 2021     | 5                 | 13                        | 18          | 14.7%  | 1.10 [0.37, 3.27]             | 1.10   | 1.10 [0.37, 3.27]             |
| Rodriguez-Leor 2021 | 12          | 130                       | 142         | 33.5%  | 0.78 [0.41, 1.47]             | 0.78   | 0.78 [0.41, 1.47]             |
| Total (95% CI)    | 258               |                            |             |        | 1.17 [0.75, 1.85]             | 1.17   | 1.17 [0.75, 1.85]             |
| Test for overall effect: Z = 0.55 (P = 0.58) |                  |                           |             |        |                                |        |                                |

### Comparison of Right Coronary Artery Disease in STEMI Patients with and without SARS-CoV-2 Infection

| Study or Subgroup | SARS-CoV-2 Events | SARS-CoV-2 Negative Events | Total Events | Weight | Odds Ratio M-H, Random, 95% CI | Weight | Odds Ratio M-H, Random, 95% CI |
|-------------------|-------------------|---------------------------|-------------|--------|--------------------------------|--------|--------------------------------|
| Chudry 2020       | 10                | 24                        | 34          | 19.8%  | 0.75 [0.31, 1.78]             | 0.75   | 0.75 [0.31, 1.78]             |
| Kini 2021         | 4                 | 208                       | 212         | 16.0%  | 0.15 [0.06, 0.40]             | 0.15   | 0.15 [0.06, 0.40]             |
| Koutrasou 2020    | 4                 | 40                        | 44          | 15.9%  | 0.45 [0.14, 1.49]             | 0.45   | 0.45 [0.14, 1.49]             |
| Marfella 2021     | 12                | 39                        | 51          | 21.4%  | 0.82 [0.38, 1.76]             | 0.82   | 0.82 [0.38, 1.76]             |
| Rodriguez-Leor 2021 | 35           | 328                       | 363         | 23.8%  | 1.13 [0.72, 1.75]             | 1.13   | 1.13 [0.72, 1.75]             |
| Total (95% CI)    | 258               |                            |             |        | 0.59 [0.30, 1.17]             | 0.59   | 0.59 [0.30, 1.17]             |
| Test for overall effect: Z = 1.52 (P = 0.13) |                  |                           |             |        |                                |        |                                |

### Comparison of Mortality in STEMI Patients with and without SARS-CoV-2 Infection

Fig 2. Selective coronary and mortality outcomes.
in-hospital mortality in patients with STEMI with SARS-CoV-2 versus without (OR 5.24; 95% Confidence Interval 3.63, 7.56) (Fig 2).11-15

Discussion

In this systematic review and meta-analysis of 5 observational studies evaluating 2,266 patients we aimed to compare coronary involvement and in-hospital mortality in patients with STEMI and SARS-CoV-2 during the COVID-19 pandemic. Our findings were: (1) There was no statistical significance between LM, LAD, LCX, or RCA involvement in patients with STEMI and SARS-CoV-2 versus without SARS-CoV-2; (2) There was a numerical trend toward LAD disease involvement in patients with STEMI and SARS-CoV-2 versus without SARS-CoV-2 (49.6% vs 44.9%); (3) Higher in-hospital mortality of statistical significance was observed in patients with STEMI and SARS-CoV-2 versus without SARS-CoV-2 (22.1% vs 5.8%, OR 5.24; 95% Confidence Interval 3.63, 7.56).

The mechanism(s) behind coronary vasculature involvement in patients with SARS-CoV-2 is not fully understood, but multiple ongoing theories exist. One potential mechanism for Type 1 myocardial injury in SARS-CoV-2 infection has been attributed to pathogen-associated molecular patterns of the virus causing activation of immune receptors on pre-existing atherosclerotic plaques increasing the likelihood of plaque dislodgement. Another proposed mechanism related to pathogen associated molecular patterns is the activation of cytokines resulting in dysfunction with resultant vasoconstriction and thrombosis of coronary artery endothelium.16 Intravascular coagulopathy associated with the so called “seeding” of microthrombi has been postulated secondary to initial pulmonary microvascular injury with subsequent systemic spread of a proinflammatory state with continued microvascular injury and thrombosis.4

A major potential cause of higher in-hospital mortality among patients with STEMI and SARS-CoV-2 during the COVID-19 pandemic is the concern for late presentation of these critically ill patients and safety measures. Tam et al in their research letter of 7 patients who underwent PCI for STEMI from January 25, 2020-February 10, 2020 found delays in patients pursuing medical care for possible exposure. Also, safety measures such as detailed history and physical examination, operator convenience with personal protective equipment, and catherization laboratory sterility played a role in timing of care.17 De Rosa et al in their multicenter observational national survey of 54 Italian intensive cardiac are units from March 12-March 19, 2020 found a reduction of 48.4% of
acute myocardial infarctions compared to March 12-19, 2019. The authors also theorize the cause of their findings to be due to late or no presentation over fear of virus contraction and the disproportionate usage of resources toward pandemic related management.  

This analysis has several limitations. Given the observational nature of the studies heterogeneity in data exists such as sample size, population location, operator experience, hospital accommodations, and hospital resources. In addition, given the observational nature, although statistical significance in in-hospital morality was appreciated, causation is difficult to imply.

Conclusion

The findings of our systematic review and meta-analysis were notable for higher in—hospital mortality among patients with STEMI and SARS-CoV-2 during the COVID-19 pandemic but without statistical significance in selective coronary involvement among the 2 groups.

Modifiable risk factors such as those seen in our patient population which included but are not limited to prior coronary artery disease (CAD), diabetes mellitus, hypertension, hyperlipidemia, and smoking should be addressed to prevent possible accelerated CAD and eventual STEMI. There was a numerical trend in LAD involvement, which is a finding that warrants further investigation and caution among patients presenting with STEMI and SARS-CoV-2.

Funding sources

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