

INPLASY PROTOCOL

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None declared.

Myocardial Perfusion Imaging in the Era of COVID-19

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Review question / Objective: This review studies all aspects of myocardial perfusion imaging with single-photon emission computed tomography (MPI SPECT) after the COVID-19 pandemic.

Condition being studied: Many imaging modalities have been reduced after the COVID-19 pandemic. Our focus in this review is to see if the number of MPIs is lowered or not and, if so, why. Furthermore, it is possible that a combination of CT attenuation correction and MPI could yield findings. In this study, we'll also look for these probable findings. Third, we know from previous studies that COVID might cause cardiac injuries in some people. Since MPI is a cardiovascular imaging technique, it might show those injuries. So we'll review articles to find out in patients with active COVID infection, long COVID, or previous COVID cases what findings in MPI those cardiac injuries can cause.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 11 April 2022 and was last updated on 11 April 2022 (registration number INPLASY202240063).

INTRODUCTION

Review question / Objective: This review studies all aspects of myocardial perfusion imaging with single-photon emission computed tomography (MPI SPECT) after the COVID-19 pandemic.

Rationale: Since the COVID-19 pandemic, medical diagnostic imaging modalities have generally decreased. In this review, we will examine previous articles. We'll look at whether the use of MPI as a diagnostic test has been reduced or not. If it has, we will measure its amount in different parts of the world. Also, we know that COVID-19 can cause cardiac injuries.

In some cases of active or previous COVID-19 or long-COVID, physicians and cardiologists, if indicated, use nuclear imaging, like MPI, to check for these potential cardiac injury findings. This review aims to collect papers that present such findings. Third, there may be pulmonary findings in attenuation-correction computed tomography (CT) scans taken along with MPI. Those findings might be seen in patients with asymptomatic COVID-19 accidentally. Some studies have reported these incidental findings of attenuation correction scans. In this paper, we also review those articles.

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METHODS

Search strategy: We are at the stage of developing a search strategy for PubMed's advanced search language, and later we'll translate this search string to our other databases' advanced search language. Our primary PubMed search strategy is being formed via the rain of thoughts technique by all authors of this review through meetings on Google Meet. Our search strategy consists of four domains:

A= SARS-Coronavirus-2, COVID-19, Long-COVID, and words that are equivalent to COVID, long-COVID, or SARS-CoV-2

B= Myocardial Perfusion Imaging and similar terms

C= SPECT and other words for it

D= Myocardium

And the search strategy would be:

A and (B OR (C AND D))

The search string of the PubMed database is as follows until today, when protocol of the review is being registered:

A = "post-acute COVID-19 syndrome" [Supplementary Concept] OR "COVID-19"[Mesh] OR covid*[tiab] OR covid-19[tiab] OR covid-19[tiab] OR "long-covid*" [tiab] OR "long-haul covid*" [tiab] OR "post-acute covid*" [tiab] OR "persistent covid*" [tiab] OR "long covid*" [tiab] OR "long haul covid*" [tiab] OR "long hauler covid*" [tiab] OR "post acute covid*" [tiab] OR "persistent covid*" [tiab] OR "chronic covid*" [tiab] OR "sars-cov-2" [tiab] OR "2019-ncov" [tiab] OR "corona virus" [tiab] OR "coronavirus" [tiab] OR "novel coronavirus" [tiab] OR "ncov-2019" [tiab] OR "severe acute respiratory syndrome coronavirus" [tiab] OR "postcovid*" [tiab] OR "post covid*" [tiab] OR "post-covid*" [tiab]

B= "Myocardial Perfusion Imaging" [Mesh] OR "myocardial perfusion imaging" [tiab] OR "myocardial perfusion scan" [tiab] OR "myocardial scintigraphy" [tiab] OR "myocardial perfusion scintigraphy" [tiab] OR "myocardial mibg scintigraphy" [tiab] OR gmps [tiab] OR "myocardial ct perfusion" [tiab] OR "sestamibi myocardial scintigraphy" [tiab] OR "myocardial perfusion single-photon emission computed tomography" [tiab] OR "myocardial perfusion spect" [tiab] OR "spect myocardial perfusion" [tiab] OR "myocardial first-pass perfusion imaging" [tiab] OR "Cardiac-Gated Single-Photon Emission Computer-Assisted Tomography" [Mesh] OR "cardiac gated single photon emission computer assisted tomography" [tiab] OR "cardiac-gated spect" [tiab] OR "cardiac gated spect" [tiab]

C= "Single Photon Emission Computed Tomography Computed Tomography" [Mesh] OR "single photon emission computed tomography" [tiab] OR spect [tiab] OR spect [tiab] OR "Perfusion Imaging" [Mesh]

D = "Myocardium" [Mesh] OR myocard* [tiab].

Participant or population: Our search will contain all records that focus on MPI and

its various aspects since the start of the COVID pandemic, regardless of study design and article type (editorials, case reports, case series, and other study designs and article types). No search filters will be used, such as language or time.

Intervention: Myocardial perfusion imaging (MPI) by single-photon emission computed tomography (SPECT).

Comparator: There are no comparators in this review. We don't compare MPI with other nuclear or non-nuclear imaging techniques.

Study designs to be included: It is possible to include all study designs without limitations in this review.

Eligibility criteria: All original English studies can be included in this review, despite their study design and article type (such as editorials, case reports, case series, etc.). We will ignore studies about other nuclear or non-nuclear cardiac imaging (e.g., PET and cardiac magnetic resonance imaging) or not about MPI. We'll also exclude papers about SPECT findings in any system other than the cardiovascular system. Additionally, records conducted and published before the pandemic will be excluded.

Information sources: PubMed, Scopus, Web of Sciences, Cochrane Central Register of Controlled Trials (via Ovid), and Embase.

Main outcome(s): Different aspects of MPI in the COVID-19 era, including comparing MPI before and after the pandemic, incidental findings of attenuation correction CT-scans, and probable findings in MPIs of active and previous cases of COVID-19 or cases with long COVID.

Additional outcome(s): After extracting articles from databases with our predetermined search strings, we'll import the papers to a library in EndNote Ver.20. Also, we'll use the "Source Title" filter on the Web of Sciences to detect two journals in which most of our records are published.

Then we will develop a more sensitive search string for those two journals, search them more specifically in the PubMed database, and add the result to our pre-made library. We'll then find duplicates using the automated duplicate finder in EndNote with default settings. In addition, we'll sort the records in the library by title alphabetically and manually check for duplicates; if there are any, we'll eliminate them. After that, we'll export the remaining records to Rayyan, a free online tool for researchers who do systematic reviews in various stages. Two of the authors of this review will screen records and judge them by their titles and abstracts. All papers that are not relevant to our research question will be excluded. The remaining items will be tagged as "maybe included." Then we export it from Rayyan and import it into a new library in EndNote, which will be named "maybe included." At this stage, we will perform forward and backward citation searching. This is searching for more related records in the references of our maybe included articles and in the papers that have cited our maybe included records. We'll detect "cited" and "cited by" records on the Google Scholar website. We'll add the results of the forward and backward citation searching stage to the "maybe included" library of Endnote and perform automated duplicate findings for the second time. Then we will export the remaining records to Rayyan, and two of the authors of this review will initiate the second phase of screening, full-text checking. Papers that are

Data management: After extracting articles from databases with our predetermined search strings, we'll import the papers to a library in EndNote Ver.20. Also, we'll use the "Source Title" filter on the Web of Sciences to detect two journals in which most of our records are published. Then we will develop a more sensitive search string for those two journals, search them more specifically in the PubMed database, and add the result to our pre-made library. We'll then find duplicates using the automated duplicate finder in EndNote with default settings. In addition, we'll sort the records in the library by title alphabetically and

manually check for duplicates; if there are any, we'll eliminate them. After that, we'll export the remaining records to Rayyan, a free online tool for researchers who do systematic reviews in various stages. Two of the authors of this review will screen records and judge them by their titles and abstracts. All papers that are not relevant to our research question will be excluded. The remaining items will be tagged as "maybe included." Then we export it from Rayyan and import it into a new library in EndNote, which will be named "maybe included." At this stage, we will perform forward and backward citation searching. This is searching for more related records in the references of our maybe included articles and in the papers that have cited our maybe included records. We'll detect "cited" and "cited by" records on the Google Scholar website. We'll add the results of the forward and backward citation searching stage to the "maybe included" library of Endnote and perform automated duplicate findings for the second time. Then we will export the remaining records to Rayyan, and two of the authors of this review will initiate the second phase of screening, full-text checking. Papers that are compatible with our inclusion criteria and don't have exclusion criteria will be tagged as "included." If there is any disagreement in the first or second screening phase, they will try to resolve it by consensus. The remaining controversies will be referred to the third author for final judgment if the authors can't come to terms "Finally included" articles' data will be entered into a Microsoft Excel sheet called "data extraction form." Each line has one record, and the columns on the form are for different things about the papers, like the title, journal, year of publication, country, study design, article

Quality assessment / Risk of bias analysis:

Since we'll include various article types and study designs (such as editorials, case reports, and case series), we can't follow a pre-determined or consistent fashion for quality assessment or risk of bias analysis. After categorizing studies and after the screening phase, we would use the Joanna

Briggs Institute (JBI) Critical Appraisal Tools, like the JBI checklist for case reports.

Strategy of data synthesis: Since this title covers multiple aspects of MPI in the COVID-19 era, and there isn't any standard numerical fashion to report all these aspects, our current desire is not to do a meta-analysis. With our current understanding of the methodology, we intend to do a qualitative analysis and report our findings in a table format, categorized.

Subgroup analysis: None.

Sensitivity analysis: None.

Language: English.

Country(ies) involved: Iran.

Keywords: Myocardial Perfusion Imaging, MPI, Single-Photon Emission Computed Tomography, SPECT, COVID-19.

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