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Contents

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Journal of
Invasive and Clinical Cardiology

INSTRUCTION TO AUTHORS

A. Introduction

The Journal of Invasive and Clinical Cardiology is a biannual, peer-reviewed journal and aims to publish work of the highest quality from all sub-specialties of Cardiology. The aim of the publication is to promote research and serve as platform for dissemination of scientific information in Cardiology.

B. Categories of Articles

The journal accepts original research, review articles, case reports, cardiovascular images and letters to the editor, for publication.

Original Research:

Original, in-depth research article that represents new and significant contributions to medical science. Each manuscript should be accompanied by a structured abstract of up to 250 words using the following headings: Objective, Methods, Results, and Conclusions. 3 to 5 keywords to facilitate indexing should be provided in alphabetical order below the abstract. The text should be arranged in sections on INTRODUCTION, METHODS, RESULTS, and DISCUSSION. The typical text length for such contributions is up to 3000 words (including title page, abstract, tables, figures, acknowledgments and key messages). Number of references should be limited to 50.

Review Articles:

Generally review articles are by invitation only. But unsolicited reviews will be considered for publication on merit basis. Following types of articles can be submitted under this category: Newer drugs, new technologies and review of a current concept. The manuscript should not exceed 5000 words (including tables and figures). A review article should include an abstract of up to 250 words describing the need and purpose of review, methods used for locating, selecting, extracting and synthesizing data, and main conclusions. The number of references should be limited to 50.

Case Reports:

Only case reports of exceptional quality will be published in the case report format. The text should not exceed 1500 words and is arranged as introduction, case report and discussion. Include a brief abstract of about 150 words. Number of tables/figures should be limited to 3. Include up to 15 most recent references. The patient's written consent, or that of the legal guardian, to publication must be obtained.

Cardiovascular Images:

Only clinical photographs with or without accompanying skiagrams, pathological images, echocardiographic images, angiographic images etc. are considered for publication. Image should clearly identify the condition and have the classical characteristics of the clinical condition. Clinical photographs of condition which are very common, where diagnosis is obvious, or where diagnosis is not at all possible on images alone would not be considered. Photographs should be of high quality, usually 127 × 173 mm (5 × 7 in) but no larger than 203 × 254 mm (8 × 10 in). A short text of up to 250 words depicting the condition is needed. Figures should be placed exactly at a logical place in the manuscript. The submitted images should be of high resolution (>300 dpi). The following file types are acceptable: JEPG and TIFF. The number of authors should not exceed 3. The authors should ensure that images of similar nature have not been published earlier. Authors must obtain signed informed consent from the patient, or the legal guardian.

Letter to the Editor:

Letters commenting upon recent articles in Journal of Invasive and Clinical Cardiology are welcome. Such letters should be received within 16 weeks of the article's publication. Letters should be up to 250 words; should contain no more than 1 figure/table and up to 5 most recent references. The text need not be divided into sections. The number of authors should not exceed 3.

C. Criteria for Acceptance

All manuscripts should meet the following criteria: the material is original, study methods are appropriate, data are sound, conclusions are reasonable and supported by the data, and the information is important; the topic has general cardiology interest; and that the article is written in reasonably good English. Manuscripts which do not follow the guidelines of Journal of Invasive and Clinical Cardiology are likely to be sent back to authors without initiating the peer-review process. All accepted manuscripts are subject to editorial modifications to suit the language and style of Journal of Invasive and Clinical Cardiology and suggestions may be made to the authors by the Editorial Board to improve the scientific value of the journal.

D. Editorial Process

Journal of Invasive and Clinical Cardiology commits to high ethical and scientific standards. Submitted manuscripts are considered with the understanding that they have not been published previously in print or electronic format (except in abstract or poster form) and are not under consideration by another publication or electronic medium. Statements and opinions expressed in the articles published in the Journal are those of the authors and not necessarily of the Editor. Neither the Editor nor the Publisher guarantees, warrants, or endorses any product or service advertised in the Journal. Journal of Invasive and Clinical Cardiology follows the guidelines on editorial independence produced by the International Committee of Medical Journal Editors (ICMJE). All manuscripts correctly submitted to Journal of Invasive and Clinical Cardiology are first reviewed by the Editors. Manuscripts are evaluated according to their scientific merit, originality, validity of the material presented and readability. Some manuscripts are returned back to the authors at this stage if the paper is deemed inappropriate for publication in Journal of Invasive and Clinical Cardiology, if the paper does not meet the submission requirements, or if the paper is not deemed to have a sufficiently high priority. All papers considered suitable by the Editors for progress further in the review process, undergo peer review by at least two reviewers. If there is any gross discrepancy between the comments of two reviewers, it is sent to a third reviewer. Peer reviewers' identities are kept confidential; authors' identities are also not disclosed to the reviewers. Accepted articles are edited, without altering the meaning, to improve clarity and understanding. Decision about provisional or final acceptance is communicated within 8 weeks.

E. Cover Letter

The cover letter should outline the importance and uniqueness of the work. It should include the signed declaration from all authors on:

1. Category of manuscript (original research, review article, case report, cardiovascular image, letter to the Editor)
2. Statement that the material has not been previously published or submitted elsewhere for publication (this restriction does not apply to abstracts published in connection with scientific meetings.)
3. Transfer of copyright to Journal of Invasive and Clinical Cardiology upon the acceptance of the manuscript for publication
4. All authors have reviewed the article and agree with its contents
5. Information of any conflicts of interest (of any) of the authors
6. Sources of research support, if any, including funding, equipment, and drugs.

The cover letter should also include the mailing address, telephone and fax numbers, and e-mail address of the corresponding author.

F. Manuscript Preparation

The manuscripts should comply with the prescribed guidelines. It should be well organized and written in simple and correct English under appropriate headings. The abbreviations and acronyms should be spelled out when they occur first time.

The Introduction should address the subject of the paper. The Methods section should describe in adequate detail the laboratory or study methods followed and state the statistical procedures employed in the research. This section should also identify the ethical guidelines followed by the investigators with regard to the population, patient samples or animal specimens used. A statement should be made, where applicable, that their study conforms to widely accepted ethical principles

guiding human research (such as the Declaration of Helsinki) and also that their study has been approved by a local ethics committee. The Results section should be concise and include pertinent findings and necessary tables and figures. The Discussion should contain conclusions based on the major findings of the study, a review of the relevant literature, clinical application of the conclusions and future research implications. Following the Discussion, Acknowledgements of important contributors and funding agencies may be given.

a. *Title page information*

- Title. Concise and informative. Titles are often used in information-retrieval systems. Avoid abbreviations where possible.
- Author names and affiliations. Please clearly indicate the given name(s) and family name(s) of each author and check that all names are accurately spelled. Present the authors' affiliation addresses (where the actual work was done) below the names. Indicate all affiliations with a lowercase superscript letter immediately after the author's name and in front of the appropriate address. Provide the e-mail address of each author.
- Corresponding author. Clearly indicate who will handle correspondence at all stages of refereeing and publication, also post-publication. Ensure that the e-mail address is given and that contact details are kept up to date by the corresponding author.

b. *Abstract*

A concise and factual abstract is required. The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separately from the article, so it must be able to stand alone. References should be avoided. Also, non-standard or uncommon abbreviations should be avoided, but if essential they must be defined at their first mention in the abstract itself.

c. *Keywords*

Immediately after the abstract, provide a maximum of 5 keywords. Keywords should be the listed terms in the Medical Subject's Headings (MeSH) of the U.S. National Library of Medicine (NLM) available at: https://www.nlm.nih.gov/mesh.

d. *Abbreviations*

Define abbreviations that are not standard in this field in a footnote to be placed on the first page of the article. Such abbreviations that are unavoidable in the abstract must be defined at their first mention there, as well as in the footnote. Ensure consistency of abbreviations throughout the article.

e. *Acknowledgements*

Collate acknowledgements in a separate section at the end of the article before the references. List here those individuals who provided help during the research (e.g., providing language help, writing assistance or proof reading the article, etc.).

f. *Units*

Follow internationally accepted rules and conventions: use the international system of units (SI). If other units are mentioned, please give their equivalent in SI. Generic rather than trade names of drugs should be used.

g. *Figures and graphics*

- For graphics, a digital picture of 300 dpi or higher resolution in JPEG or TIFF format should be submitted.
- Figures should be numbered consecutively according to the order in which they have been first cited in the text, if there is more than 1 figure. Each figure should be cited in the text.
- Each figure/illustration should be provided with a suitable legend that includes enough information to permit its interpretation without reference to the text.
- All photomicrographs should indicate the magnification of the prints.
- When symbols, arrows, numbers or letters are used to identify parts of the illustrations, each one should be explained clearly in the legend.

h. *Tables*

Tables should be placed next to the relevant text in the article.

- Number tables consecutively in accordance with their appearance in the text. Each table should be cited in the text in Arabic numerals.
- Titles should be brief and a short or abbreviated heading for each column should be given.
- Explanatory matter should be placed in footnotes and not in the heading.
- Abbreviations in each table should be explained in footnotes.
- The data presented in a table should not be repeated in the text or figure.

i. *References*

The authors are responsible for the accuracy and completeness of the references and their citations in the text.

References should follow the standards summarized in the NLM's International Committee of Medical Journal Editors (ICMJE) Recommendations for the Conduct, Reporting, Editing and Publication of Scholarly Work in Medical Journals (ICMJE Recommendations), available at: http://www.icmje.org/recommendations/. The titles of journals should be abbreviated according to the style used for MEDLINE (www.ncbi.nlm.nih.gov/nlmcatalog/journals). Journals that are not indexed should be written in full.

- References should be numbered consecutively in the order in which they are first mentioned in the text.
- References in text, tables and legends should be identified by superscript Arabic numerals at the end of the sentence outside any punctuation. If several different studies or papers are cited within one sentence, the number should be placed where it will accurately identify the correct study.
- The names of authors in the text should concur with the reference list.
- References cited only in tables or in legends to figures should be numbered in accordance with a sequence established by the first identification in the text of the particular table or illustration.
- Abstracts as references may be used; "unpublished observations" and "personal communications" may not be used as references, although references to written, not oral, communications may be inserted (in parentheses) in the text.
- Papers accepted but not yet published may be included as references by adding "In press" after the journal name. Information from manuscripts submitted but not yet accepted should be cited in the text as "unpublished observations" (in parentheses).
- In general: All authors/editors should be listed unless the number exceeds six, when you should give six followed by "et al."

Examples of correct forms of references are given below:

Articles in Journals (see also *Journal article on the Internet*)

1. *Standard journal article*

   List the first six authors followed by et al.

   Halpern SD, Ubel PA, Caplan AL. Solid-organ transplantation in HIV-infected patients. N Engl J Med. 2002 Jul 25;347(4):284-7.

   More than six authors:

   Rose ME, Huerbin MB, Melick J, Marion DW, Palmer AM, Schiding JK, et al. Regulation of interstitial excitatory amino acid concentrations after cortical contusion injury. Brain Res. 2002;935(1-2):40-6.

2. *Organization as author*

   Diabetes Prevention Program Research Group. Hypertension, insulin, and proinsulin in participants with impaired glucose tolerance. Hypertension. 2002;40(5):679-86.

3. *Both personal authors and organization as author* (List all as they appear in the byline.)

   Vallancien G, Emberton M, Harving N, van Moorselaar RJ; Alf-One Study Group. Sexual dysfunction in 1,274 European men suffering

from lower urinary tract symptoms. J Urol. 2003;169(6):2257-61.

4. *Volume with supplement*

   Geraud G, Spierings EL, Keywood C. Tolerability and safety of frovatriptan with short- and long-term use for treatment of migraine and in comparison with sumatriptan. Headache. 2002;42 Suppl 2:S93-9.

5. *Issue with supplement*

   Glauser TA. Integrating clinical trial data into clinical practice. Neurology. 2002;58(12 Suppl 7):S6-12.

6. *Type of article indicated as needed*

   Tor M, Turker H. International approaches to the prescription of long-term oxygen therapy [letter]. Eur Respir J. 2002;20(1):242.

   Lofwall MR, Strain EC, Brooner RK, Kindbom KA, Bigelow GE. Characteristics of older methadone maintenance (MM) patients [abstract]. Drug Alcohol Depend. 2002;66 Suppl 1:S105.

7. *Article published electronically ahead of the print version*

   Yu WM, Hawley TS, Hawley RG, Qu CK. Immortalization of yolk sac-derived precursor cells. Blood. 2002 Nov 15;100(10):3828-31. Epub 2002 Jul 5.

Books and Other Monographs

1. *Personal author(s)*

   Murray PR, Rosenthal KS, Kobayashi GS, Pfaller MA. Medical microbiology. 4th ed. St. Louis: Mosby; 2002.

2. *Editor(s), compiler(s) as author*

   Gilstrap LC 3rd, Cunningham FG, VanDorsten JP, editors. Operative obstetrics. 2nd ed. New York: McGraw-Hill; 2002.

3. *Organization(s) as author*

   Advanced Life Support Group. Acute medical emergencies: the practical approach. London: BMJ Books; 2001. 454 p.

4. *Chapter in a book*

   Meltzer PS, Kallioniemi A, Trent JM. Chromosome alterations in human solid tumors. In: Vogelstein B, Kinzler KW, editors. The genetic basis of human cancer. New York: McGraw-Hill; 2002. p. 93-113.

5. *Conference proceedings*

   Harnden P, Joffe JK, Jones WG, editors. Germ cell tumours V. Proceedings of the 5th Germ Cell Tumour Conference; 2001 Sep 13-15; Leeds, UK. New York: Springer; 2002.

6. *Dissertation or thesis*

   Borkowski MM. Infant sleep and feeding: a telephone survey of Hispanic Americans [dissertation]. Mount Pleasant (MI): Central Michigan University; 2002.

Other Published Material

Newspaper article

Tynan T. Medical improvements lower homicide rate: study sees drop in assault rate. The Washington Post. 2002 Aug 12;Sect. A:2 (col. 4).

Unpublished Material

In press or Forthcoming

Tian D, Araki H, Stahl E, Bergelson J, Kreitman M. Signature of balancing selection in Arabidopsis. Proc Natl Acad Sci U S A. Forthcoming 2002.

Electronic Material

1. *Journal article on the Internet*

Abood S. Quality improvement initiative in nursing homes: the ANA acts in an advisory role. Am J Nurs. 2002 Jun [cited 2002 Aug 12];102(6):[about 1 p.]. Available from: http://www.nursingworld.org/AJN/2002/june/Wawatch.htmArticle

Article published electronically ahead of the print version:

Yu WM, Hawley TS, Hawley RG, Qu CK. Immortalization of yolk sac-derived precursor cells. Blood. 2002 Nov 15;100(10):3828-31. Epub 2002 Jul 5.

Article with document number in place of traditional pagination:

Williams JS, Brown SM, Conlin PR. Videos in clinical medicine. Blood-pressure measurement. N Engl J Med. 2009 Jan 29;360(5):e6. PubMed PMID: 19179309.

Article with a Digital Object Identifier (DOI):

Zhang M, Holman CD, Price SD, Sanfilippo FM, Preen DB, Bulsara MK. Comorbidity and repeat

admission to hospital for adverse drug reactions in older adults: retrospective cohort study. BMJ. 2009 Jan 7;338:a2752. doi: 10.1136/bmj.a2752. PubMed PMID: 19129307; PubMed Central PMCID: PMC2615549.

2. *Monograph on the Internet*

   Foley KM, Gelband H, editors. Improving palliative care for cancer [Internet]. Washington: National Academy Press; 2001 [cited 2002 Jul 9]. Available from: http://www.nap.edu/books/0309074029/html/.

3. *Homepage/Web site*

   Cancer-Pain.org [Internet]. New York: Association of Cancer Online Resources, Inc.; c2000-01 [updated 2002 May 16; cited 2002 Jul 9]. Available from: http://www.cancer-pain.org/.

G. Submission Preparation Checklist

As part of the submission process, authors are required to check off their submission's compliance with all of the following items, and submissions may be returned to authors that do not adhere to these guidelines.

1. The submission has not been previously published elsewhere, is original and has been written by the stated authors.
2. The article is not currently being considered for publication by any other journal and will not be submitted for such review while under review by the Bangladesh Heart Journal.
3. The submission file is in Microsoft Word file format, and the figures are in JEPG or TIFF format.
4. The text is single-spaced; uses a 12-point font; employs italics, rather than underlining (except with URL addresses); and all illustrations, figures, and tables are placed within the text at the appropriate points, rather than at the end.
5. The text adheres to the stylistic and bibliographic requirements outlined in the Instruction to Authors. Make sure that the references have been written according to the ICMJE Recommendations Style.
6. Spell and grammar checks have been performed.
7. All authors have read the manuscript and agree to publish it.
8.

H. **Submission**

Papers should be submitted to the Editor. Three copies of manuscript should be submitted duly signed by all authors with a copy of CD, to:

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Re-incarnation of Renal Denervation

Prakash Kumar Hazra

J Inv Clin Cardiol 2020; 2(2): 39-41

Eleven years after the first patient was treated with the Symplicity Arch catheter by Murray Esler and colleagues in Melbourne, Australia.[1] our knowledge about the renal sympathetic nervous system and its modulation by catheter-based renal denervation has significantly evolved. This minimally invasive approach was developed to destroy the renal afferent and efferent sympathetic nerves in the vessel wall of the renal arteries by means of radiofrequency energy.

Very few therapies in medicine have had such a roller-coaster ride as renal artery denervation (RDN). Early hope of treating resistant hypertension was sky high when trials reported large reduction of pressure in patients resistant to polypharmacy. Yet euphoria turned to something close to despair when, later, sham control trial with older generation single electrode catheter at the ostia of renal arteries failed to repeat the results. Recently, there is a resurgence of this new therapy from its near-death experience. The reincarnation of renal denervation with new spiral four quadrant electrodes has brought us a new hope for many patients who are drug intolerant drug resistant to multiple available attractive polypills.

The unmet need is undisputed: hypertension is the most notorious silent killer along with diabetes in Indo -Bangladesh population. Population surge ageing smoking air and sound pollution adding salt to the sores. Hardly any new drug has emerged in last 10 years to combat the pandemic cardiovascular mortalities in South East Asians.

The hope of drug free or drug de-escalation regimens is very attractive to the patients is good for society at large.

The first surgical sympathectomy for control of hypertension was practised way back in 1934. But it did not see the light of the day because of surgical mortality. Hexamethonium came in 1949, hydralazine in 1952, reserpine 1954, hydrochlorthaizde in 1959, guanethidine 1960, captopril in 1975, verapamil 1982, atenolol amlodipine ARB ARNI Spironolactone SGLT2 inhibitors, came much later. Now it is well known that renal sympathetic nerves regulate renin secretion, tubular fluid reabsorption and renal haemodynamic, which modulates BP control. Within months after the publication of early RDN trials there were over 60 new start-ups in the RDN field.

After the boom, the bust. After joyous celebration sadness of premature death of new born baby came. A revival than same old story. Many criticism retrospection, analysis, re-analysis could not solve puzzle till a new spyral catheter design came as rescue. The SYMPLICITY HTN-3 trial, the first prospective, masked, randomised study of RDN versus sham control, reported neutral outcomes and there was general disappointment and disbelief.[2] The fall-out was severe: many start-ups lost their investments and most of the multinational device giants stopped their RDN clinical trial programmes.

Extensive analyses were conducted post SYMPLICITY HTN to explore why the trial did not meet its primary efficacy endpoint. A number of confounding factors were identified, e.g., baseline SBP, use of and changes in hypertensive medications, adherence, study population, and procedural methods such as the number of ablation attempts, energy delivery and operator experience. These confounding factors highlighted the complex and multifactorial nature of hypertension and indicated that addressing only one aspect of the disease might not be sufficient. The situation is further compounded by the fact that renal artery denervation is a blind procedure with no clinical or technical marker of successful nerve ablation during the procedure.

SYMPLICITY HTN-3 thinktanks came back to the drawing board, and came out with new technology and study design. New Symplicity Spyral™ multi-

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electrode RDN catheter (Medtronic, Minneapolis, MN, USA) was born. The two initial trials focused on the effect of RDN in the absence (SPYRAL HTN-OFF MED) and presence (SPYRAL HTN-ON MED) of concomitant antihypertensive medications. Both were sham-controlled which deserved lot of appreciations for efficacy safety and simplicity of design.

In the proof-of-concept 3 month SPYRAL HTN-OFF MED, which included a three- to four-week drug washout period and in the absence of antihypertensive medications, office and 24-hr ambulatory BP decreased significantly from baseline to three months in the RDN group: 24-hr SBP "5.5 mmHg, 24-hr DBP "4.8 mmHg; office SBP "10.0 mmHg, and office DBP "5.3 mmHg. No significant changes were seen in the sham-control group. This was a moon shot slam-dung moment after a heavy heart from SYMPLICITY HTN-3.

SPYRAL HTN-ON MED was a large (n=467), multicentre study in which all patients were treated with a consistent triple therapy antihypertensive regimen.[3] This trial too met its endpoints: there were significantly greater BP reductions in RDN group than in the sham-control group at 6 months both for office BP (SBP difference 6.8 mmHg, 95% CI: 12.5 to 1.1; p=0.0205; DBP difference 3.5 mmHg, 95% CI: 7.0 to –0.0; p=0.0478) and for 24-hr ambulatory BP (SBP difference 7.4 mmHg, 95% CI: 12.5 to 2.3; p=0.0051; DBP difference 4.1 mmHg, 95% CI: 7.8 to –0.4; p=0.0292). These results were published in 2018 on the same day as a further sham-controlled RDN trial, RADIANCE-HTN SOLO, which investigated the ultrasound Paradise® renal denervation system (ReCor Medical, Palo Alto, CA, USA) in patients off antihypertensive medication.[4] The reduction in daytime ambulatory SBP in RADIANCE-HTN SOLO was greater with RDN (8.5 ± 9.3 mmHg) than with sham procedure (2.2±10.0 mmHg). The baseline-adjusted difference between groups was –6.3 mmHg, 95% CI: 9.4 to 3.1; p=0.0001 in favour of RDN. Now we have three back to back positive sham-controlled trials using different RDN technologies.

The identification of suitable patients and appropriate ablation locations from ostium to distal anatomy lesser ablation time and sites changed the game .Ideas for ideal patient changed from severe to moderate hypertension and non-resistant hypertension as initially thought. This can be attributed to the greater potential for moderating the underlying pathophysiology in moderate hypertensive patients compared with those with irreversible damage who have missed the bus. Patients recruited in the SPYRAL OFF/ON trials were patients with moderate hypertension compared with patients with severe hypertension in SYMPLICITY HTN-3.

However, it is interesting to note that in RADIANCE-HTN SOLO only the main branch was denervated unlike Medtronic spyral technology where both main and branches ablated, yet the reduction in office and 24-hr BP was similar in both off-medication trials. This may indicate efficacy differences between technologies: ultrasound achieves greater penetration of the renal artery than thermal energy (ultrasound 6-7 mm vs. radiofrequency 3-4 mm). We know that response to RDN is dose-dependent. Thermal energy might be equivalent to ultrasound in the main branch if the dose of thermal energy is equivalent to the dose of ultrasound.

A recently published prospective, randomised, single-blind, single-centre non -sham control trial by Fengler et al. [5] supports these speculations, although in a different population with lesser side branch ablation than SPYRAL -HTN study .Patients with resistant hypertension were randomised in a 1:1:1 manner to either: 1) radiofrequency RDN of the main renal arteries, 2) radiofrequency RDN of the main renal arteries, side branches and accessories, or 3) endovascular ultrasound-based RDN of the main renal artery. At three months, there was a significantly greater reduction in systolic ambulatory blood pressure monitoring (ABPM) in the ultrasound ablation group than in the radiofrequency ablation group of the main renal artery (13.2±13.7 vs. 6.5±10.3 mmHg; mean difference 6.7; 98.3% confidence interval 13.2 to -0.2; adjusted p=0.043). Radiofrequency ablation of the side branches achieved a non-significant additional 1.8 mmHg reduction over radiofrequency ablation of the main artery (98.3% confidence interval 8.5 to 4.9; adjusted p>0.99) and there was no significant difference between this group and the ultrasound group (mean difference –4.9 mmHg in favour of ultrasound; 98.3% confidence interval 11.5 to 1.7; adjusted p=0.22).Large, multicentre head-to-head trials are needed to mitigate the paradox . The greatest challenge currently is to identify responders to RDN mapping of nerves. Challenge is to predict the size which fits all and stay away from sizes which do not fit at all. No one is born equal and no face looks similar

in this world then why blame non responders. Radiofrequency ablation in atrial fibrillation does not work for all cardiac resynchronisation therapy it is non responding in 30 % cases. let the new born grow naturally with good parental care and guidance and long term futuristic visions.

The recent series of successful trials shows that RDN is reborn as a serious treatment alternative. This will never match the initial euphoria and expectations. let's push the envelope to deserving patients . If the topsy turvy ride less dizzying, we will all benefit.

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1. Symplicity HTN-2 Investigators, Esler MD, Krum H, Sobotka PA, Schlaich MP, Schmieder RE, Böhm M. Renal sympathetic denervation in patients with treatment-resistant hypertension (The Symplicity HTN-2 Trial): a randomised controlled trial. Lancet. 2010 Dec 4;376(9756):1903-9.
2. Bhatt DL, Kandzari DE, O'Neill WW, D'Agostino R, Flack JM, Katzen BT, Leon MB, Liu M, Mauri L, Negoita M, Cohen SA, Oparil S, Rocha-Singh K, Townsend RR, Bakris GL; SYMPLICITY HTN-3 Investigators. A controlled trial of renal denervation for resistant hypertension. N Engl J Med. 2014 Apr 10;370(15):1393-401.
3. Böhm M, Townsend RR, Kario K, Kandzari D, Mahfoud F, Weber MA, Schmieder RE, Tsioufis K, Hickey GL, Fahy M, DeBruin V, Brar S, Pocock S. Rationale and design of two randomized sham-controlled trials of catheter-based renal denervation in subjects with uncontrolled hypertension in the absence (SPYRAL HTN-OFF MED Pivotal) and presence (SPYRAL HTN-ON MED Expansion) of antihypertensive medications: a novel approach using Bayesian design. Clin Res Cardiol. 2020 Mar;109(3):289-302.
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5. Fengler K, Rommel KP, Lapusca R, Blazek S, Besler C, Hartung P, von Roeder M, Kresoja KP, Desch S, Thiele H, Lurz P. Renal Denervation in Isolated Systolic Hypertension Using Different Catheter Techniques and Technologies. Hypertension. 2019 Aug;74(2):341-348.

Epicardial Fat Thickness in Relation with Demographic Variables among Patients with or Without Metabolic Syndrome

K.A.M. Mahbub Hasan[1], Al-Mamun[2], Mehedi Hasan[3], Sushil Kumar Bagchi[4], Naheed Fatema[5], Hasan Mahmoud[6]

Abstract:

Background: Epicardial fat thickness is varied among patients with or without metabolic syndrome. Objective: The purpose of the present study was to find out the relationship of epicardial fat thickness with demographic variables among patients with or without metabolic syndrome. Methodology: This comparative cross-sectional study was conducted in the Department of Cardiology at National Institute of Cardiovascular Diseases, Dhaka, Bangladesh from April 2017 to March 2018 for a period of one year. Depending on the diagnosis of metabolic syndrome (MetS), patients were divided into two groups, group I patients with MetS and group II patients without MetS. The epicardial fat thickness of group I and group II were prospectively examined by echocardiography. Then the comparison of the epicardial fat thickness was done between the two groups. Result: A total of 130 patients were recruited for this study. The study subjects were divided into two groups of which 65 patients diagnosed as metabolic syndrome patients were assigned in group I and the rest of 65 patients without metabolic syndrome were assigned in group II. The mean epicardial fat thickness (mm) was found significantly higher in metabolic syndrome patients of 31 to 40 years, 41 to 50 years, 51 to 60 years and more than 60 years age groups in comparison to non-metabolic syndrome patients of similar age group which were 5.7±0.7 vs. 3.1±1.1, 5.5±1.0 vs. 2.6±0.8, 5.7±0.9 vs. 2.5±0.4 and 6.3±0.5 vs. 2.7±0.3 respectively ($p<0.05$). The mean epicardial fat thickness (mm) was found significantly higher in both male and female metabolic syndrome patients in comparison to non-metabolic syndrome patients which was 5.6 ± 0.9 vs. 2.7 ± 0.8 and 5.7 ± 0.9 vs. 2.9 ± 1.0 respectively ($p=0.000$). The mean epicardial fat thickness (mm) was found significantly higher in both smoker and non-smoker metabolic syndrome patients than non-metabolic syndrome patients which was 5.7±1.0 vs. 2.9±0.8 and 5.6±0.9 vs. 2.7±0.9 respectively ($p=0.000$). Conclusion: In conclusion epicardial fat thickness is statistically significantly associated with the age and gender of the patients presented with metabolic syndrome.

Keywords: Epicardial fat thickness; demographic variables; metabolic syndrome.

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Introduction:

Metabolic syndrome has an impact on the morbidity and mortality.[1] Approximately 20.0% to 25.0% of the world's adult population have metabolic syndrome.[2] An increasing trend has also been observed in Asian countries. People with MetS are three times as likely to have a heart attack or stroke and are twice as likely to die from a heart attack or stroke compared with people without the syndrome. Therefore the high prevalence of the metabolic syndrome has significant public health implications due to the increased risk of cardiovascular disease and type 2 diabetes.[3]

Metabolic syndrome can occur in different reasons. Lemieux, et al[4] have suggested the importance of abdominal obesity and the so-called hypertriglyceridemic waist phenotype as a central component. Although the cause of the syndrome is still not determined, visceral obesity seems to play a

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key role in the development of all features of metabolic syndrome[5-7]. Hence, detection of visceral adipose tissue, the fat deposited around the internal organs, might be important for risk stratification of metabolic syndrome.

The current obesity epidemic is one of the greatest public health concerns all over the world.[8] For the last few years, the prevalence of obesity and metabolic syndrome is rapidly increasing in South Asian countries due to rapid nutritional changes, lifestyle and socioeconomic transitions, consequent to increasing affluence, urbanization, mechanization, and rural to urban migration.[1] Metabolic syndrome and cardiovascular risk in Bangladeshi population are also heightened by their relative increase in body fat mass, truncal subcutaneous fat mass, intra-abdominal fat mass, and also in ectopic fat deposition.[9] However, as a measure of visceral adipose tissue, its sensitivity and specificity are not so high. Therefore other new reliable markers are evolving. In this respect epicardial adipose tissue estimation might be a suitable alternative. The epicardial fat thickness being a marker of visceral adiposity is gaining more attention worldwide.[10] Several studies done in different populations have proven relationship between epicardial fat thickness and metabolic syndrome. However, there is no such study in our population. The aim of this present study was to establish an association between echocardiographic epicardial fat thickness in relation with age and gender of the patients with or without metabolic syndrome.

Methodology:

Study Design and Settings: This present study was designed as an analytic type of cross-sectional study. This study was carried out in the Department of Cardiology at National Institute of Cardiovascular Diseases (NICVD), Dhaka, Bangladesh. This study was conducted from April 2017 to March 2018 for a period of one (01) year. All patients ee18 year old of both sexes attended in the indoor and outdoor echocardiography department of NICVD for echocardiography during the specified period were selected as the study population. The patients who were fulfilling inclusion and exclusion criteria were selected for the study as the sample population. The samples were collected by purposive sampling method. Patients with moderate to severe valvular heart disease, congenital heart disease and cardiomyopathy, patients with acute coronary syndrome (ACS), patients who were on lipid lowering drugs, history of taking corticosteroid or other weight gaining drugs, patients with pericardial effusion, patients with ascites and or edema or patients with poor echo window were excluded from this study. The study protocol was approved by Ethical Review Committee of NICVD.

Study Procedure: Informed written consent was a mandatory prerequisite for every patient. Echocardiography (Siemens Acuson X 700) was done and epicardial fat thickness was measured by 2-D echocardiography in two different views which were in parasternal long axis (PLAX) view and in parasternal short axis (PSAX) view at mid-ventricular level. Two cardiologists expert in echocardiography, measured the fat thickness would be unaware about the clinical and laboratory parameters of the patients. Data were collected by using a preformed data collection sheet. Metabolic syndrome (MetS) was diagnosed on the basis of modified NCEP ATP III definition. Depending on the diagnosis of MetS, patients were divided into two groups. The epicardial fat thickness among the groups were compared and were analyzed.

Statistical Analysis: The numerical data obtained from the study were analyzed and significance of differences were estimated by using statistical methods. Continuous variables were expressed as mean values with standard deviation and were compared using Student's t-test. Categorical variables were expressed as frequencies with percentages and were compared using Chi-square test or Fisher's exact test. Statistical significance was assumed if $p < 0.05$. Statistical analyses were carried out by using SPSS 23.0 (Statistical Package for the Social Sciences by SPSS Inc., Chicago, IL, USA, 2015).

Result:

A total of 130 patients were recruited for this study after fulfilling the inclusion and exclusion criteria. On the basis of the diagnosis of metabolic syndrome, the study subjects were divided into two groups of which 65 patients who had fulfilled the diagnosis of metabolic syndrome were assigned in group I and the rest of 65 patients who did not fulfill the diagnosis of metabolic syndrome were assigned in group II. The comparison of epicardial fat thickness of study groups according to the age grouping was done. The mean epicardial fat thickness (mm) was found significantly higher in metabolic syndrome patients of 31 to 40 years, 41 to 50 years, 51 to 60 years and more than 60 years age groups in comparison to non-metabolic syndrome patients of similar age group which were 5.7±0.7 vs. 3.1±1.1, 5.5±1.0 vs.

2.6±0.8, 5.7±0.9 vs. 2.5±0.4 and 6.3±0.5 vs. 2.7±0.3 respectively. There was no significant difference of epicardial fat thickness in metabolic and non-metabolic patients of less than 30 years age which was 4.0±0.0 vs. 2.8±1.0 (p=0.302) (Table I).

Table-I

Comparison of Epicardial Fat Thickness of Study Groups According to the Age Group (n=130)

Age Group	Epicardial Fat Thickness		P value
	Group I	Group II	
Less Than 30 Years	4.0 ± 0.0	2.8 ± 1.0	0.302^{ns}
31 to 40 Years	5.7 ± 0.7	3.1 ± 1.1	0.000^{s}
41 to 50 Years	5.5 ± 1.0	2.6 ± 0.8	0.000^{s}
51 to 60 Years	5.7 ± 0.9	2.5 ± 0.4	0.000^{s}
More Than 60 years	6.3 ± 0.5	2.7 ± 0.3	0.000^{s}

s = Significant (p <0.05); ns = Not significant (p >0.05); Data were analyzed using unpaired t-test

The mean epicardial fat thickness (mm) was found significantly higher in both male and female metabolic syndrome patients in comparison to non-metabolic syndrome patients which was 5.6±0.9 vs. 2.7±0.8 and 5.7±0.9 vs. 2.9±1.0 respectively (Table 2).

Table-II

Comparison of Epicardial Fat Thickness of Study Groups According to the Gender (n=130)

Gender	Epicardial Fat Thickness		P value
	Group I	Group I	
Male	5.6 ± 0.9	2.7 ± 0.8	0.000^{s}
Female	5.7 ± 0.9	2.9 ± 1.0	0.000^{s}

s = Significant (p <0.05); Data were analyzed using unpaired t-test

The comparison of epicardial fat thickness of study groups was done according to smoking status. The mean epicardial fat thickness (mm) was found significantly higher in both smoker and non-smoker metabolic syndrome patients than non-metabolic syndrome patients which was 5.7±1.0 vs. 2.9±0.8 and 5.6±0.9 vs. 2.7±0.9 respectively (Table 3).

Table-III

Comparison of Epicardial Fat thickness of study groups according to smoking status (n=130)

Smoking status	Epicardial Fat Thickness		P value
	Group I	Group I	
Smoker	5.7 ± 1.0	2.9 ± 0.8	0.000^{s}
Non-smoker	5.6 ± 0.9	2.7 ± 0.9	0.000^{s}

s = Significant (p <0.05); Data were analyzed using unpaired t-test

Discussion:

This observational analytic (cross sectional) study was undertaken at the National Institute of Cardiovascular Diseases (NICVD), Dhaka, during the period of April 2017 to March 2018. A total of 130 patients who agreed to do echocardiography and relevant investigations were included in the study. Anthropometric parameters and blood pressure were measured and relevant investigations were sent. On the basis of the diagnosis of metabolic syndrome, the study subjects were divided into two groups. 65 patients who fulfilled the diagnosis of metabolic syndrome were assigned in group I and another 65 patients who did not fulfill the diagnosis of metabolic syndrome were assigned in group II.

Epicardial fat thickness was studied in metabolic and non-metabolic syndrome patients according to the age grouping. The mean epicardial fat thickness (mm) was found significantly higher in metabolic syndrome patients of 31 to 40 years, 41 to 50 years, 51 to 60 years and more than 60 years age groups in comparison to non-metabolic syndrome patients of similar age group. A systematic review done by Rabkin[11] also found significantly higher epicardial fat thickness in metabolic syndrome patients irrespective of the age of the studied patients. In this present study, there was no significant difference of epicardial fat thickness in metabolic and non-metabolic patients of less than 30 years age (p = 0.302). The reason behind this was very small sample size in this age group. If the sample size is large the association may become significant.

Comparison of epicardial fat thickness in metabolic and non-metabolic syndrome patients according to the gender was studied. The mean epicardial fat thickness (mm) was found significantly higher in both male and female metabolic syndrome patients in comparison to non-metabolic syndrome patients. In a study it has been found that there is a significantly higher epicardial fat thickness in male and female metabolic syndrome patients over non-metabolic syndrome patients.[12] Comparison of epicardial fat thickness of study groups according to smoking status was also studied. The mean epicardial fat thickness (mm) was found significantly higher in both smoker and non-smoker metabolic syndrome patients than non-metabolic syndrome patients. This finding was also consistent with other studies.[13-14]

Epicardial fat thickness is associated with the abnormal lipid profiles. Even different co-morbidities are also in

relation with the epicardial fat thickness. Considering this issue, Bhuiyan et al[15] have found a relationship between echocardiographic epicardial adipose tissue (EAT) thickness and angiographically detected coronary artery disease. Epicardial adipose tissue thickness measurements by echocardiography were compared with coronary angiographic findings. Echocardiographic epicardial adipose tissue thickness was significantly higher in patients with CAD in comparison to those with normal coronary arteries ($p<0.001$). Therefore it is very important considering the age and gender of the patients especially the CAD patients.

Conclusion:

In conclusion the epicardial fat thickness is found significantly higher in metabolic syndrome patients considering the age groups in comparison to non-metabolic syndrome patients of similar age group. Again, the mean epicardial fat thickness is found significantly higher in both male and female metabolic syndrome patients than non-metabolic syndrome patients. Furthermore, the mean epicardial fat thickness is also significantly higher in both smoker and non-smoker metabolic syndrome patients than non-metabolic syndrome patients.

Conflict of Interests

Authors have no conflict of interests.

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Association of Non-alcoholic Fatty Liver Disease with Coronary Artery Disease

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Abstract:

Background: Nonalcoholic fatty liver disease (NAFLD) is the most common cause of chronic liver disease around the world. Several common metabolic risk factors contribute to development of both NAFLD and coronary artery disease (CAD). Objective: To find out the association between NAFLD and CAD. Methodology: This cross sectional observational study was conducted from April, 2018 to September, 2019 in the Department of Cardiology, National Institute of Cardiovascular Diseases (NICVD), Dhaka, Bangladesh. A total of 93 patients were enrolled in the study after fulfilling inclusion and exclusion criteria. Then, NAFLD was diagnosed and graded by abdominal ultrasonography. Liver fibrosis was assessed by shear wave elastography at the same time. Patients were then categorized into two groups: Group I were those with NAFLD and Group II were those without NAFLD. Coronary angiography was then performed and extent and severity of CAD was assessed by Gensini score. Then the association of NAFLD and liver fibrosis with presence and severity of CAD was analyzed statistically. Result: Out of 93 patients, 25.8% patients were female. Mean age of the patients was 50.6±10.0 years. CAD was significantly more common in group I than in group II patients (80.3% vs. 59.1%; p=0.04). Severe CAD patients were also significantly more common in group I than in group II (49.3% vs. 22.7%, p=0.03). Correlation between increasing severity of NAFLD and CAD severity was found to be positive (r=0.33) and statistically significant (p=0.001). The mean value of SWE score was significantly higher in patients with severe CAD than in patients with less severe CAD (1.96±0.53 vs. 1.28±0.23 m/s, p<0.001). Correlation between Gensini score and SWE score was found to be strongly positive (r=0.64) and statistically significant (p<0.001). Conclusion: NAFLD as well as liver fibrosis are associated with presence and severity of CAD. Moreover, NAFLD may be considered as an independent risk factor for CAD.

Key words: Nonalcoholic fatty liver disease, Coronary artery disease, Liver fibrosis, Ultrasound, Angiography, Shear Wave Elastography.

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Introduction:

Nonalcoholic fatty liver disease (NAFLD) is one of the epidemics of our generation, and it is the leading cause of liver dysfunction worldwide and a rapidly growing health problem. NAFLD is defined by excessive fat accumulation (steatosis) in the in the liver[1] in the absence of significant alcohol consumption (defined as >20 g/day in women and >30 g/day in men) and all other causes of secondary steatosis[2]. NAFLD is regarded as the liver manifestation of the metabolic syndrome, because it is strongly associated with obesity, Type 2 diabetes mellitus or insulin resistance, hypertension, and dyslipidemia.[3] NAFLD comprises simple steatosis to steato-hepatitis (NASH), cirrhosis and hepatocellular carcinoma (HCC).[4] The most important predictor of adverse outcomes in NAFLD is

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the presence of fibrosis.[5,6] There is a small increase in all-cause mortality even at very early fibrosis, which rises on a linear scale with progressive fibrosis stage.[7] Many studies have shown that there is independent contribution of NAFLD to an increased risk of clinically relevant coronary artery disease (CAD), even after correction for the well-established risk factors for CAD.[8] Most of the previous studies had related between NAFLD and CAD. No such study was done in our country till today. In this study, we aimed to investigate the association between NAFLD and presence and severity of CAD. Besides this, we have also studied the association of NAFLD-associated liver fibrosis with the severity of CAD.

Materials and Methods:

Subjects and study design

This cross-sectional, observational study was conducted in the Department of Cardiology, National Institute of Cardiovascular Diseases (NICVD), Dhaka, Bangladesh from April, 2018 to September, 2019 in patients undergoing coronary angiogram for suspected or established coronary artery disease (CAD). Patients with history of alcohol intake, known liver disease, heart failure, cor pulmonale, chronic kidney disease, malignancy, acute or chronic infections, positive serology for hepatitis B, C, human immunodeficiency virus (HIV) or syphilis, pregnancy, any medical records of hemochromatosis, autoim-mune hepatitis, suboptimal acoustic imaging of the liver and history of drug use reported to cause steatosis (steroids, tamoxifen, amiodarone, valproic acid, diltiazem, or methotrexate) were excluded from the study. Informed written consent was taken from each patient before enrollment. Sample size was calculated by considering the proportion of CAD of 84.6% in patients with NAFLD and 64.1% in those without NAFLD in a study done by Wong et al. (2011)[9]. We determined 186 patients required to achieve 5% level of significance with 90% power. But due to time constrains, 93 was taken as study sample size. The study protocol was approved by the Ethical Review Committee of NICVD. Hepatic ultrasound scanning was performed using Siemens Acuson 2000 machine in all the subjects by one trained radiologist, who was not be informed of the clinical history and coronary angiogram (CAG) results of the patients. Grading of nonalcoholic fatty liver diseases (NAFLD) was done on visual assessment of gray scale imaging: Absence or grade 0 NAFLD: Normal liver echogenicity; Grade I or Mild NAFLD: Increased echogenicity of liver, normally seen diaphragm and intrahepatic vessels; Grade II or Moderate NAFLD: Moderate increase echogenicity, mildly obscured visualization of diaphragm and intrahepatic vessels; Grade III or Severe NAFLD: Marked increase in echogenicity, obscured penetration, poor or non-visualization of diaphragm and intrahepatic vessels.[10] Shear Wave Elastography (SWE) was done to assess the presence of liver fibrosis at the same time of hepatic ultrasound. A cut-off value of 1.35 m/s was taken based on the study of Abe et al. (2018).[11] A SWE score d"1.35 m/s indicated absence of fibrosis and a score of >1.35 m/s indicated presence of liver fibrosis. Based upon hepatic ultrasound, patients were grouped into two groups- Group I: Patients with NAFLD; Group II: Patients without NAFLD. Coronary angiography was then performed by conventional method and examined by two experienced interventional cardiologists who were blind to the clinical characteristics and laboratory results of the patients. Presence of CAD was defined as a stenosis of at least 50% in at least one major coronary artery. The severity of CAD was assessed by the Gensini score. Significant stenosis was defined as more than 70% diameter stenosis.[12]

Statistical Methods:

Quantitative variables were assessed with the unpaired t-test and qualitative variables were compared with the chi-square and Fisher's exact test. Correlation between CAD severity and degree of NAFLD was analyzed using Spearman's Rank correlation analysis. Correlation was also analyzed between CAD severity and liver fibrosis using Pearson's correlation analysis. A p-value <0.05 was considered significant. All analysis was conducted using the SPSS for windows 16.0 statistical software.

Results:

Out of 93 patients, 25.8% patients were female. The mean age ± SD of the total study patients was 50.6 ± 10.0 years, ranging from 25 to 75 years. Male patients were predominant in both groups. Mean BMI of group I was slightly higher than that of group II (26.0±4.1 vs. 24.9±3.7 kg/m^2) but the difference was not statistically significant (p = 0.3). Traditional risk factors of CAD were slightly more in group I than in group II but this difference did not reach the level of statistical significance (p>0.05). The distribution of patients was

almost identical in both groups in terms of clinical diagnosis. Thus from Table I it was clear that there was no significant difference between patients with NAFLD and those without NAFLD in terms of their age, sex, BMI, clinical diagnosis and risk factor profile.

Table II shows that CAD was significantly more common in group I than in group II patients (80.3% vs. 59.1%; p=0.04). Severe CAD patients were also significantly more common in group I than in group II (49.3% vs. 22.7%, p=0.03).

Correlation between increasing severity of NAFLD and CAD severity was found to be mildly positive (r=0.33) and statistically significant (p=0.001) (Figure I). The mean value of SWE score was significantly higher in

Table-I

Different study parameters in two groups of the study subjects (N=93).

Characteristics		Group I (n= 71) Number (%)	Group II (n=22) Number (%)	Total(N=93) Number (%)	p value
Gender					
	Male	50 (70.4%)	19 (86.4%)	69 (74.2%)	0.11^{ns}
	Female	21 (29.6%)	3 (13.6%)	24 (25.8%)	
Age					
	Mean ± SD	50.8 ± 10.5	50.1 ± 8.6	50.6 ± 10.0	$0.76^{ns}0.76^{ns}$
	Range	25 - 75	35 - 66	25 - 75	
Smoking					
	Yes	39 (54.9)	12 (54.5)	51 (54.8)	0.97^{ns}
	No	32 (45.1)	10 (45.5)	42 (45.2)	
Hypertension					
	Yes	48 (67.6)	13 (59.1)	61 (65.6)	0.46^{ns}
	No	23 (32.4)	9 (40.9)	32 (34.4)	
Diabetes mellitus					
	Yes	47 (66.2)	11 (50.0)	58 (62.4)	0.17^{ns}
	No	24 (33.8)	11 (50.0)	35 (37.6)	
Dyslipidaemia					
	Yes	42 (59.2)	9 (40.9)	51 (54.8)	0.13^{ns}
	No	29 (40.8)	13 (59.1)	42 (45.2)	
Family H/o of CAD					
	Yes	19 (26.8)	6 (27.3)	25 (26.9)	0.96^{ns}
	No	52 (73.2)	16 (72.7)	68 (73.1)	
Obesity					
	Yes	14 (19.7)	4 (18.2)	18 (19.4)	0.87^{ns}
	No	57 (80.3)	18 (81.8)	75 (80.6)	
BMI (Kg/m^2) Mean ± SD	26.0±4.1	24.9±3.7		0.30^{ns}	
Clinical diagnosis					
	STEMI	31 (43.7)	6 (27.3)		0.16^{ns}
	NSTEMI	12 (16.9)	2 (9.1)		0.57^{ns}
	UA	4 (5.6)	3 (13.6)		0.21^{ns}
	CSA	24 (33.8)	11 (50.0)		0.17^{ns}

Group I : Patients with NAFLD; Group II : Patients without NAFLD; BMI : Body Mass Index (Kg/m2); CAD: Coronary artery disease; CSA : Chronic stable angina; ns = Not significant (p > 0.05); NSTEMI : Non-ST elevation myocardial infarction; STEMI : ST elevation myocardial infarction; UA : Unstable angina;

Table-II

Comparison of the study patients according to the presence and severity of CAD (N=93).

Presence of CAD	Study patients		Total	p value
	Group I Number (%)	Group II Number (%)	Number (%)	
CAD present	57 (80.3)	13 (59.1)	70 (75.3)	0.04[s]
CAD absent	14 (19.7)	9 (40.9)	23 (24.7)	
Severe CAD (GS >36 points)	35 (49.3)	5 (22.7)	40 (43.0)	0.03[s]
No disease to moderate CAD (GS d"36 points)	36 (50.7)	17 (77.3)	53 (57.0)	
Total	71 (100.0)	22 (100.0)	93 (100.0)	

Group I : Patients with NAFLD; Group II : Patients without NAFLD ; CAD : Coronary artery disease; GS : Gensini score; s = Significant (p<0.05).

Table-III

Comparison of mean shear wave elastography (SWE) score of the study patients according to CAD severity. (N=93).

SWE score m/s	Severe CAD (GS >36 points) (n=40)	No disease (≤36 points) (n=53) to moderate CAD	p value
Mean ± SD	1.96 ± 0.53	1.28 ± 0.23	<0.001[s]

CAD : Coronary artery disease; GS : Gensini score; S = Significant; SWE : Shear wave elastography

patients with severe CAD than in patients with less severe CAD (1.96±0.53 vs. 1.28±0.23 m/s, p<0.001) (Table III). Correlation between Gensini score and SWE score was found to be strongly positive (r=0.64) and statistically significant (p<0.001) indicating that increasing degree of liver fibrosis is associated with more severe CAD (Figure II).

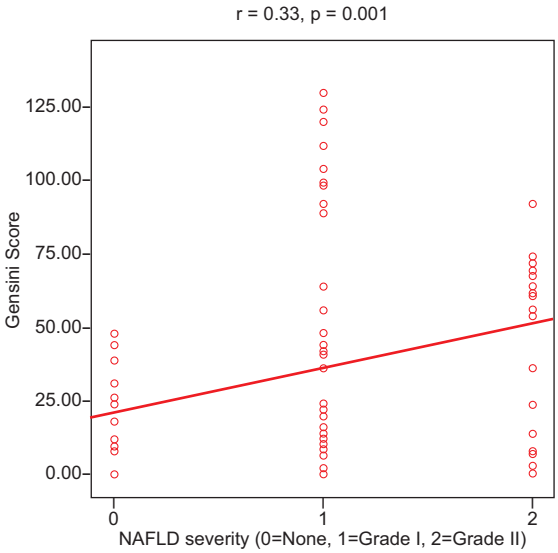

Fig.-1: *Scatter plot diagram showing correlation between NAFLD severity and Gensini score.*

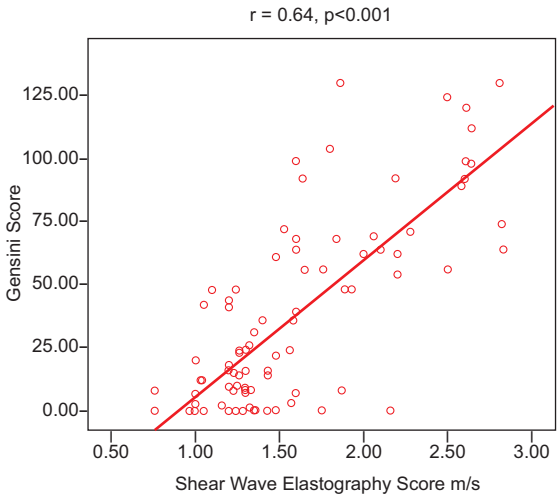

Fig.-2: *Scatter plot diagram showing correlation between shear wave elastography score and Gensini score.*

Discussion:

Our findings demonstrate that non-alcoholic fatty liver disease (NAFLD) is associated with the presence and severity of coronary artery disease (CAD) in a grade-dependent manner. Our results also demonstrate that NAFLD is a significant predictor of CAD independent of traditional risk factors. Furthermore, NAFLD-

associated liver fibrosis was also associated with the severity of CAD. Although the exact reason is not yet well-understood, increasing the activity of inflammatory mediators, decreasing the endothelial function, adiponectin levels, collateral circulation, vascular repair capacity, and atherogenic lipoprotein profile are described as important causative factors of CAD in NAFLD patients.[13,14]

This present study demonstrated that CAD was significantly more common in patients with NAFLD than in patients without (80.3% vs. 59.1%; p=0.04). Furthermore, severe CAD patients were also significantly more common in patients with NAFLD than in patients without (49.3% vs. 22.7%, p=0.03) with significant correlation between them (r=0.33; p=0.001). Other studies also showed the almost similar prevalence of CAD in NAFLD patients. Study of Wong et al. (2011)[9] showed a proportion of CAD of 84.6% in patients with NAFLD and 64.1% in those without NAFLD (p<0.001). Hossain et al. (2010)[15] studied 93 patients where prevalence of angiographically-proven CAD in the NAFLD cohort was 61% as compared to 26% in the non-NAFLD controls (p=0.010). Adibi et al. (2013)[16] showed that the prevalence and grade of fatty liver in CAD patients was significantly more common than the control group. They concluded that NAFLD was a risk factor of CAD and increase in the prevalence of NAFLD can lead to the increase in cardiovascular diseases.

In the present study, the mean value of SWE score was significantly higher in patients with severe CAD than in patients with less severe CAD (1.96±0.53 vs. 1.28±0.23 m/s, p<0.001). Correlation between SWE score and Gensini score by Pearson's correlation test was found to be strongly positive (r=0.64) and statistically significant (p<0.001) indicating that increasing degree of liver fibrosis is associated with more severe CAD. More recent studies consistently show that among the patients of NAFLD, those who have associated NASH, have the higher prevalence of CAD.[17] Ostovaneh et al. (2018)[18] assessed liver fibrosis by T1-mapping magnetic resonance imaging and found the association of liver fibrosis with heart failure, atrial fibrillation, and CAD in a multiethnic cohort. Dogan et al. (2015)[19] studied 155 patients in a cross-sectional prospective study. They assessed liver fibrosis by NAFLD fibrosis score (NFS) and CAD risk by Framingham risk score (FRS). They found that the FRS (CAD risk) was associated with the NFS (liver fibrosis) in NAFLD.

Despite strenuous efforts, we could not avoid several important limitations. All patients underwent coronary angiography for significant clinical indication. This produced a selection bias by creating a group with a very high prevalence of advanced CAD. Although ultrasonography has a favorable sensitivity and specificity in detecting NAFLD, it is not a gold standard approach. Ultrasound cannot differentiate between simple steatosis and NASH. On the other hand, shear wave elastography is not a gold standard approach to detect liver fibrosis as compared to liver biopsy. Sample size was relatively small. A larger sample size could have provided a greater statistical power and permitted more complete adjustment for potential confounders. Because of convenient sampling, our study patients may not represent our whole population. All patients were collected from a single center. This is why, most of the study patients might have come from a particular socio-economic condition.

Conclusion:

From this study, it can be concluded that nonalcoholic fatty liver disease (NAFLD) is associated with the presence and severity of coronary artery diseases (CAD). Also, NAFLD is an independent risk factor for CAD. Presence of liver fibrosis in NAFLD makes this association even stronger.

Recommendations

Large scale, well-designed prospective studies can be done in order to further establish the association between NAFLD and CAD severity. Large prospective study can be done to see if life style modification and therapeutic intervention in NAFLD patients can reduce the morbidity and mortality of CAD.

Conflict of Interests

Authors have no conflict of interests.

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In-Hospital Outcome of Primary Percutaneous Coronary Intervention During Covid-19 Pandemic: A Single Center Study in the Peripheral Region of Bangladesh

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Abstract

Background: Primary PCI is a golden standard to treat acute STEMI patients in a PCI capable center [(1).] Lower incidence of re-infarction or death is observed to the patients who undergo for PCI during index hospitalization [(2)]. However during this pandemic, the management of STEMI is challenging as Covid 19 patients who develop cardiovascular disease may also mimic STEMI in ECG [(3)].Moreover Unavailability of rapid detection test(RDT),delayed RT PCR result for Covid 19 screening facility made it worse in the context of spreading infection among the Health Care Workers(HCWs) and patient during pandemic. In this perspective, we considered all patients as Covid-19 possible [(4)] and setup a protocol to ensure that the overall patient population in this region continues to benefit from the tremendous advancements in cardiovascular care made over the past three decades [(5)].

Objective: In this Covid-19 era there is always a potential threat for non-Covid patient and hospital staff to expose to potential danger of COVID infection. Exact data on managing acute STEMI patient in Bangladesh is not well understood during this pandemic. At our hospital we developed a protocol to treat acute STEMI patient and carried out this observational study to share the in-hospital outcome.

Method: This is a retrospective observational study included acute STEMI patients treated with Primary PCI (PPCI) from March'20 to March'21. Pharmaco-invasive PCI, Elective PCI and conservatively treated STEMI patients were excluded.

Result: Total 210 patients were admitted as acute STEMI in last one year. Total 85 Patients were treated with Primary PCI (40.5%) and 3 patients died (3.5%) in the index hospitalization who underwent for PPCI.

Conclusion: In this retrospective observational study we found that PPCI to treat of acute STEMI patients and its in-hospital outcome is relatively safe and effective if we could set a protocol according to international guidelines even with a very limited resources in this pandemic period.

Keywords: Covid-19 pandemic, PPCI, acute STEMI, in hospital outcome.

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Introduction:

The novel coronavirus disease 2019 (COVID-19), is highly contagious and has resulted in a global pandemic, became a major threat to global health[6] including Bangladesh also. Being a densely populated country, many are affected, died and some suffering from life threating complications those who recovered. 1st case of Covid-19 was detected in Bangladesh on 8th March, 2020 and our journey has started as a PCI capable center in the peripheral region of Bangladesh on 14th March, 2020. During this pandemic, with some exceptions our health policy imposed generalized restrictions on RT PCR test and RDT facility for private health organization. Our hospital is assigned as a non-Covid multi care tertiary hospital since the beginning of pandemic and admitting only suspected/probable cases. Confirmed positive and highly suspected cases are referred to Corona dedicated hospital. In Bangladesh, most of the center has only one Cath lab (like us) and it is very challenging to treat acute STEMI patient with PPCI strategy first in this global pandemic. In the absence of in-hospital Covid screening facility

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we set a protocol to continue PPCI strategy first [1] to treat acute STEMI in contrary to recently published protocol of fibrinolysis-first strategy for STEMI patients from china.[7] Recent consensus statement from the Society for Cardiovascular Angiography and Interventions (SCAI), American College of Cardiology (ACC), and American College of Emergency Physicians (ACEP) recommends PPCI should remain preferred strategy to treat acute STEMI in this pandemic period also [8]. Due to Unavailability of screening facility we considered all patients as Covid-19 possible (Negative commoner sign-symptoms of Covid 19).

Methods:

This retrospective observational study was conducted in a tertiary care multidisciplinary private medical college hospital in the peripheral region of Bangladesh from March'2020 to March'2021.Pharmaco Invasive PCI, Elective PCI and conservatively managed acute STEMI patients and highly Suspected /Probable Covid -19 cases [4] were excluded. STEMI patient eligible for PPCI (within 12 hours symptoms onset) were assessed by ED/EMS stayed focused on classical clinical symptoms (typical ischemic chest pain) consistent with EKG, negative Covid like symptoms (fever, cough, sob, anosmia), bedside TTE(RWMA) consistent with EKG, bedside CXR (excluding pneumonic consolidation), pre procedural blood biochemistry (hsTroponin I, RBS, S. Creatinine) absence of contact history with positive or probable infected cases within last 14 days. Due to unavailability of Rapid Detection Test (RDT) and delayed result of RT PCR for COVID-19 we consider every patient as Covid-19 Possible and ensured standard personal protective measures for HCWs as well as for the patients along with 24/7 rotational strong emergency response team which includes interventionist also.[9]

Data Analysis:

All data were summarized and displayed as mean ± standard deviation and in percentages.

Result:

Total 210 acute STEMI patients were admitted in this period and 85 patients were studied who underwent for Primary PCI in last one year. Male female ratio was (5.5:1). Average Age was 54.00±11.08 years. [Table 1, Fig 1]. 43 (50.5%) patients were diagnosed as acute Inferior MI), 25 (29.4%) patients as acute Extensive anterior MI and 17(20%) patients as acute Antero-septal MI [Table 2]. Both Trans femoral 59(69.5%) and Trans radial 26(30.4%) routes were approached +(Table 3). 37(43.5%) patients had single vessel CAD, 27(31.7%) patients had Double vessel CAD, 21 (24.7%) patients had Triple vessel CAD and 5(5.8%) patients had LM involvement (Table 4). In-hospital outcome showed that total 85(40.5%) acute STEMI patients were treated with PPCI of which 3 (3.5%) patients were encountered death during or after procedure due to other complications (Table 5, Figure 2). Risk factor analysis showed that 45(53%) patients had a history of Hypertension, 20 (23%) patients had DM, 28(33%) patients had smoking history and 18(21%) patient had positive family history (Table 6, Figure 3).

Table-I

Demographic characteristics (n=85)

Characteristics	Frequency	Percentage
Age in years		
≤35	5	5.8
35-55	51	60
>55	29	34.1
Mean±SD	54.00±11.08	
Gender		
Male	72	85
Female	13	15
Male female ratio	5.5:1	

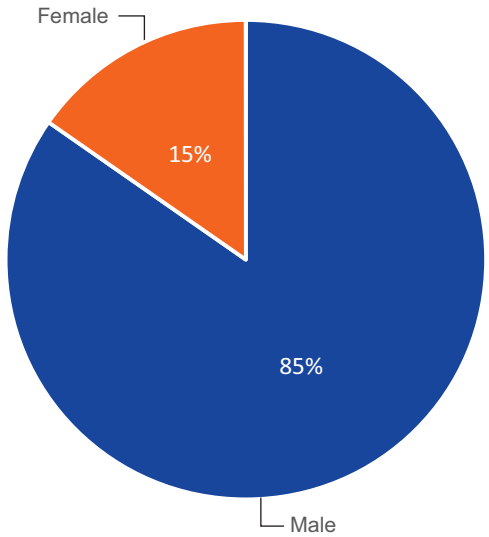

Fig.-1: *Sex distribution of the subject.*

Table-II

Catheterization route (n=85)

Route	Frequency	Percentage
Right radial artery	26	30.5
Right femoral artery	59	69.5

Table-III

Percentage distribution of acute STEMI patients treated with PPCI (n=85)

Type	Frequency	Percentage
Acute inferior MI	43	50.5
Acute extensive anterior MI	25	29.4
Acute Antero-septal MI	17	20

Table-IV

Percentage distribution of involved vessels (n=85) treated with PPCI

Vessels	Frequency	Percentage
Single vessel	37	43.5
Double vessel	27	31.7
Triple vessel	21	24.7
left main involvement	05	5.8

Table-V

In-hospital outcome of STEMI (n=85) patients treated with PPCI.

No of acute STEMI patients	Treated with PPCI	Percentage	Successful PPCI	Percentage	In hospital death	Percentage %
210	85	40.5	82	96.5	03	3.5

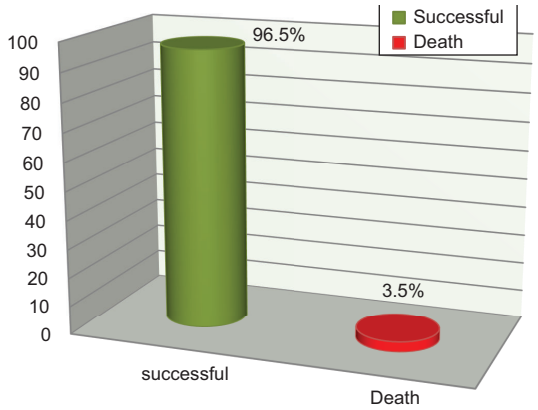

Fig.-2: *In-hospital outcome of PPCI.*

Table-VI

Percentage distribution of CAD risk factor (n=85)

Risk factor	Frequency	Percentage
HTN	45	52.9
DM	20	23
Smoking	28	33
Positive Family history	18	21

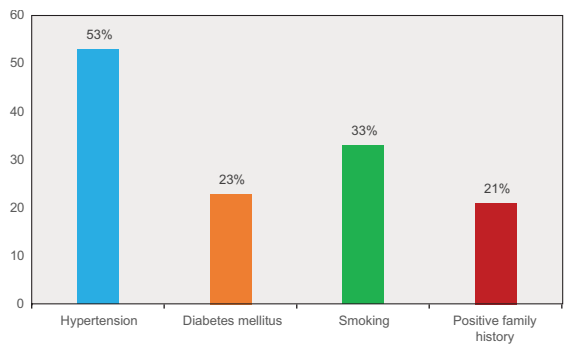

Fig.-3: *Percentage distribution of CAD risk factor.*

Discussion:

Optimum management of acute cardiac conditions such as ST-segment elevation myocardial infarction (STEMI) is very much challenging in this crisis situation. Exposing the catheterization laboratory team and EMS personnel to the infection and delay in delivering care are the two majors constrain for effective management of acute STEMI. Contraindication for thrombolysis and Cardiac involvement in the clinical course of COVID-19 infection is also common [10]. Moreover, several cases have been reported with viral infections and acute myocarditis noted to have STEMI on the EKG.[11]. Takotsubo, myopericarditis, and possibly even spontaneous coronary artery dissection during acute infections also may mimic STEMI on EKG [3]. Currently, there are no published studies evaluating different STEMI treatment strategies during a pandemic. Zeng et al. from Sichuan Provincial People's Hospital recently published a protocol describing the use of thrombolysis in STEMI patients if the onset of symptoms was within 12 h and proceeding with PCI only after the patient had tested negative for COVID-19[7]. Charan Yerasi et al.[12] published a review and outline the risks and benefits of primary PCI vs. thrombolysis for STEMI describing that with a high probability of the angiogram showing non-obstructed coronary arteries during acute infections, primary PCI should be the preferred strategy while thrombolysis may seem like a good choice but many patients have a contraindication and could end up using more resources in this pandemic.

A Position statement by SCAI, ACC and ACEP described the management of acute STEMI during Covid-19 pandemic giving special attention on;

1) Diverse clinical presentations;
2) Proper personal protection equipment (PPE) for health care workers;
3) Crucial Role of the Emergency Department, Emergency Medical System and the Cardiac Catheterization Laboratory; and
4) Recommends primary PCI should remain the preferred strategy for STEMI patients at PCI capable hospitals when it can be provided in a timely fashion, with an expert team outfitted with PPE in a dedicated CCL room. At non-PCI capable referral hospitals or in specific situations where primary PCI cannot be executed or is not a best option fibrinolysis-based strategy may be an alternative [8].Primary PCI is superior for establishing normal (TIMI grade 3) coronary flow compared with an initial fibrinolysis strategy which has significant bleeding risk. Almost 50% patient requiring rescue PCI after fibrinolysis due to incomplete thrombolysis with residual stenosis [1]. We have a single CCL and has no option for positive and highly suspected cases. Though we do not have separate building block or Covid dedicated Cath lab, we made a protocol to treat acute STEMI patients based on PPCI strategy first considering all patient as Covid-19 possible and continued our CCL activity according to our set protocol as per guidelines [8,9]. Stage PCI for non-infarct related artery were deferred in the same setting to minimize the risk of CCL staff and patient's further exposure risk to COVID-19. In this study we found better in-hospital survival outcome by giving emphasis on provision of enough PPE for HCWs, proper training on donning and doffing, rotational emergency response team, careful case selections in ED and regular cleaning of CCL and limiting the possible contamination of COVID positive cases and preserve the healthcare professionals.

Conclusion*:*

Treatment of STEMI during pandemic is challenging. In this era, we should also keep in mind that the majority of ischemic heart disease patient may not be infected with this novel coronavirus who are in need of emergency cardiac care. May be thrombolysis is a good choice, many patients have a contraindication, many patients presented with other cardiac conditions mimic STEMI and if thrombolysis is given, it would end up using more resources in these limited hospital settings. However, in acute infections and pandemics there is a high probability of finding normal coronary arteries in CAG, it is imperative for physicians to use primary PCI as the initial preferred strategy in these stressful situations rather than blindly choosing thrombolytics to avoid unwanted complications. Non-invasive diagnostic testing may be useful to differentiate true STEMIs from mimics. In addition, setting up a center-based protocol according to guidelines is crucial to limit the risk of acquiring infection and our recent study also speaks for it even with a very limited resources in these pandemic situations.

Conflict of Interests

Authors have no conflict of interests.

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Relationship between Coagulopathy and Cardiac Injury in Covid-19-An update

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Abstract:

Cardiac injury and coagulation disorders have been two increasing concerns in the management of patients with severe coronavirus disease (Covid-19). Markers of activated coagulation or impaired fibrinolysis particularly D-dimer might be related to acute myocardial injury. Previous studies have shown an increase in D-dimer concentrations in Covid-19 patients. Elevated D-dimer level have been found to be associated with poor outcome and increased mortality. In addition, underlying diseases such as diabetes, cancer, stroke, and pregnancy may trigger an increase in D-dimer levels in Covid-19 patients. However, the association of biomarker of coagulation like D-dimer with biomarker of cardiac injury like troponin-I in Covid-19 patients has not been adequately addressed.

Keywords: Covid-19,coagulopathy D-dimer, Cardiac Injury, troponin.

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Introduction:

In December 2019, a novel viral infection outbreak occured in Wuhan, China, spreading worldwide within several weeks. The infection was subsequently termed as coronavirus disease-2019 (Covid-19) and declared a pandemic by the World Health Organization by March 2020.[1] On January 7, 2020, International Committee on Taxonomy of Viruses (ICTV) isolated a novel corona virus and named it as Severe Acute Respiratory Syndrome coronavirus 2 (SARS-CoV-2).[2,3] On February 11, 2020 World Health Organization named this pneumonia as Coronavirus Disease 2019 (Covid-19). Threatening global health and undermining the global economy across the world the Covid-19 outbreak has become a pandemic.[4-6]

The confirmation of spread of SARS-CoV-2 virus in Bangladesh was happened on March 2020. On 8 March 2020, IEDCR; the country's epidemiology institute reported the first Three cases. Since then, number of affected cases has been increasing and the pandemic has spread over the whole nation. Eventually as it has tremendous effect on people's health and country's economy it as become the number one public health concern.

Clinical manifestations of Covid-19:

The illness manifests from asymptomatic or mild infection to severe respiratory tract infections. Presentations include fever, coughing, myalgia, dyspnea, watery diarrhea, chest pain, cardiac diseases ,severe lymphopenia, prolonged coagulation profiles and sudden death.[7,2] Recent descriptive study in china showed that patients had clinical manifestations of fever 83% , cough 82% , shortness of breath 31%, muscle ache 11%, confusion 9%, headache 8%, sore throat 5%, rhinorrhea 4%, chest pain 2%, diarrhea 2%, and nausea and vomiting 1%. On chest imaging examination 75% patients showed bilateral pneumonia, 14% patients showed multiple

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mottling and ground-glass opacity, and 1% patient had pneumothorax.17% patients developed acute respiratory distress syndrome and, among them, 11% patients deteriorated in a short period of time and died of multi-organ failure.[7]

Coagulopathy in Covid-19:

Evidence shows that severe SARS CoV-2 triggers coagulation cascade which ultimately leads to thrombotic complication.[8] The D-dimer, a relatively small protein fragment and fibrin degradation product, appears in the blood following fibrinolysis of a blood clot. Thrombotic states, including pulmonary embolism and disseminated intravascular coagulation (DIC) can be diagnosed by determining the circulating D-dimer concentrations in clinical practice.[9] Higher D-dimer concentration was observed in severe cases of community-acquired pneumonia (CAP) and chronic obstructive pulmonary disease (COPD) and was associated with poor prognosis.[10-12] Adult Covid-19 patients with D-dimer level > 1 ¼g/ml was associated with increased mortality.[13] D-dimer concentration was shown to be higher in severe form of Covid-19 compared with milder form in a recent meta-analysis.[14]

There might be several reasons for serum D-dimer concentration to be elevated. First, Excess thrombin generation occurs as result of endothelial dysfunction which is induced by viral infection.[15] Second, Severe Covid-19 can stimulate thrombosis by increasing blood viscosity and transcription factor-dependent signaling pathway as a result of hypoxia.[16]

Third, patients with severe Covid-19 who are hospitalized, are older with underlying comorbidities, long-term immobility, and invasive treatment, which are predisposing factors for hypercoagulation or thrombosis.[18-20] Evidence shows, occlusion and micro-thrombosis was found in small pulmonary vessels while dissecting the lungs of deceased Covid-19 patients.[21] Fourth, In some patients DIC and Sepsis which induces coagulopathy was observed.[22,23]

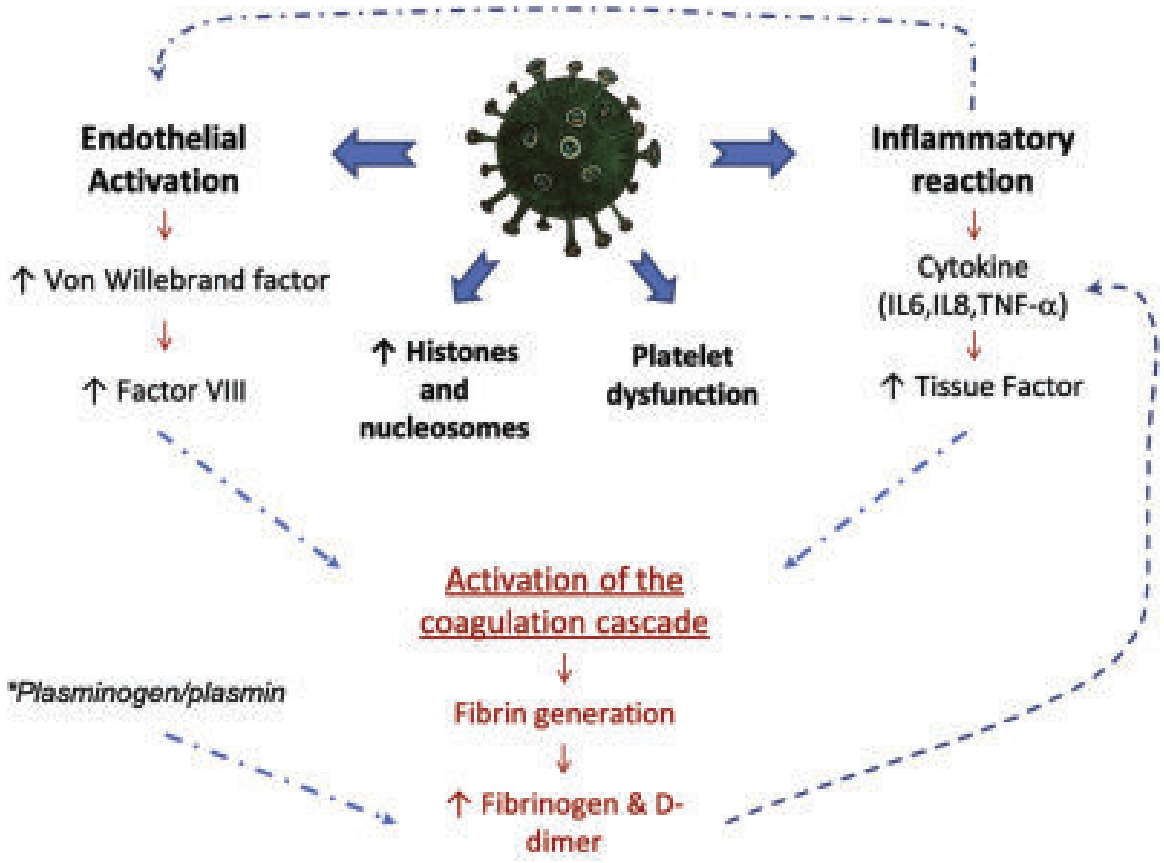

Fig.-1: *Coagulation impairment in Covid-19*[17]

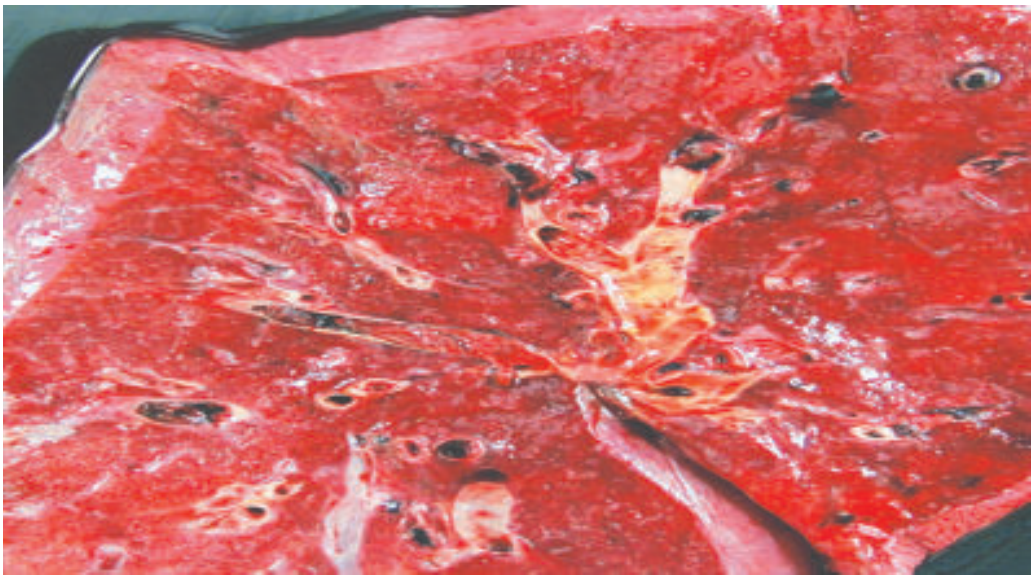

Fig.-2: Cut sections showing thrombi present within lung vasculature[21]

Cardiovascular implication of Covid-19:

In preceding outbreaks of Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS) noticeable cardiovascular ailments and comorbidities were observed.[24] Covid-19 patients also show significant cardiac manifestations. Myocardium of Covid-19 patients revealed infiltration of inflammatory cells in the interstitium when autopsy done.[25] Coronaviruses are single-stranded enveloped ribonucleic acid (RNA) viruses with spike proteins which are surface projections.[26] SARS-CoV-2 enters into cell via angiotensin-converting enzyme 2 (ACE2) receptors which also trigger infection process.[27-28] ACE2 has numerous physiological action in the body systems among which conversion to CV protective peptides like angiotensin (Ang) II to Ang-(1–7), and Ang I to Ang-(1–9) is the primary role. [29]

SARS-CoV-2 enters into the alveolar epithelial cells by a process that involves transmembrane protein serine 2 (TMPRSS2) which are proteins associated with cell surface. This process happens when ACE2 binds with the spike protein of the virus and allow the entry of the virus into the cells (Figure 3).[31]

Many patients with Covid-19 have cardiovascular disease (CVD) including myocarditis, hypertension and acute cardiac injury though it is a disease of respiratory system primarily [32,33]. In heart and cardiac vasculature upregulation of ACE2 may leads to myocardial injury induced by SARS-CoV-2.[34] Damage to the myocardium is mainly by immune mechanisms but hypoxia and respiratory failure in Covid-19 may also contribute.[35,33,34] Considering the significant pathophysiological role of the RAS/ACE2 in the cardiovascular system CVD may also be a primary endpoint of Covid-19 as ACE2 is expressed in human heart, pericytes and vascular cells.[33] Cardiac biomarkers levels are increased in Covid-19 infections as a result of myocardial injury.[36,37,25] Myocardial injury in Covid-19, which is defined by an increased cardiac biomarker especially troponin level, occurs mainly due to non-ischemic myocardial processes, including hypoxia with severe respiratory involvement, systemic inflammation, pulmonary thrombosis and embolism sepsis, myocarditis, and cytokine storm leading to cardiac adrenergic hyperstimulation.[38] Beyond other mechanisms; myocardial injury in COVID-19 patients may also be due to coronary spasm, plaque rupture, vascular injury or direct endothelial injury by microthrombi.[39]

A study on 416 patients by Shi et al.[37] have shown cardiac injury as a common finding (19.7%) among the the 57 deceased. Coronary artery disease (CAD) in 10.6%, HF in 4.1%, and cerebrovascular disease in 5.3% was observed in the deceased. Moreover, cardiac injury was independently and significantly associated with mortality in multivariable adjusted models (hazard ratio [HR]: 4.26).[37] Similarly, in a study by Guo et al.,[36] significant higher mortality was observed in patients with elevated troponin-T levels

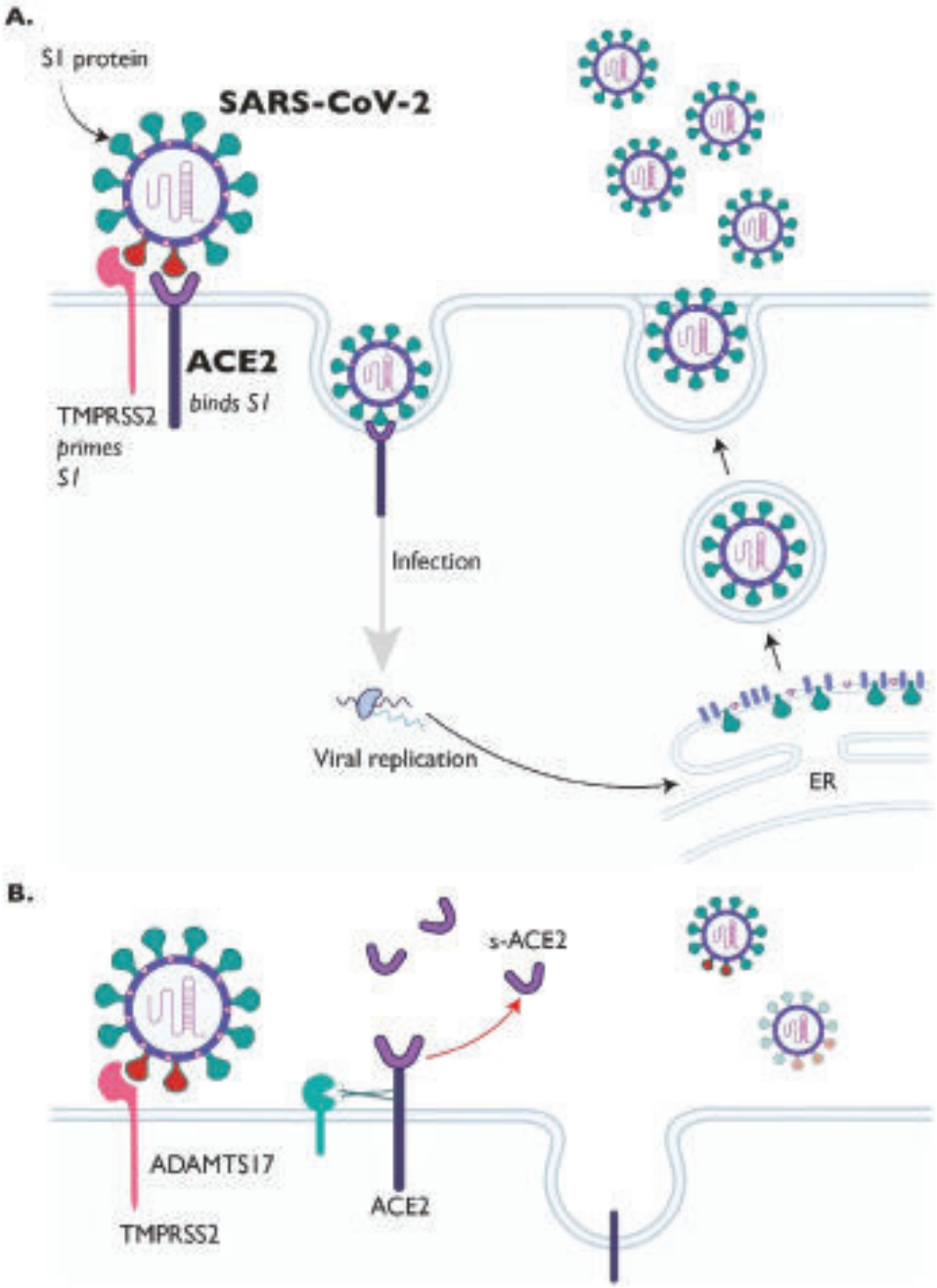

Fig.-3*: Critical Role of ACE2 in the regulation of viral invasion in ACE2 Expressing Cell*[30]

due to cardiac injury. These patients have more comorbidities such as coronary heart disease, hypertension and were more likely to be men from older age group.[36] Specific indicators of myocardial injury like cTnI, CK-MB, NT-pro BNP and Mb are increased in varying degree in severe Covid-19 patients who are admitted in intensive care unit.[40] Cardiac troponin circulating in blood is a marker of myocardial injury when myocardial infarction or myocarditis is attributed to be the important cause. Elevation of troponin in Covid-19 patients is multifactorial and less likely to be due to coronary occlusion resulting from atherothrombosis.[41]

Impact of coagulopathy on cardiac injury:

Worse in-hospital outcome was observed Covid-19 patients with D-dimer surge leading to cardiac injury and these coagulation disorders was higher among

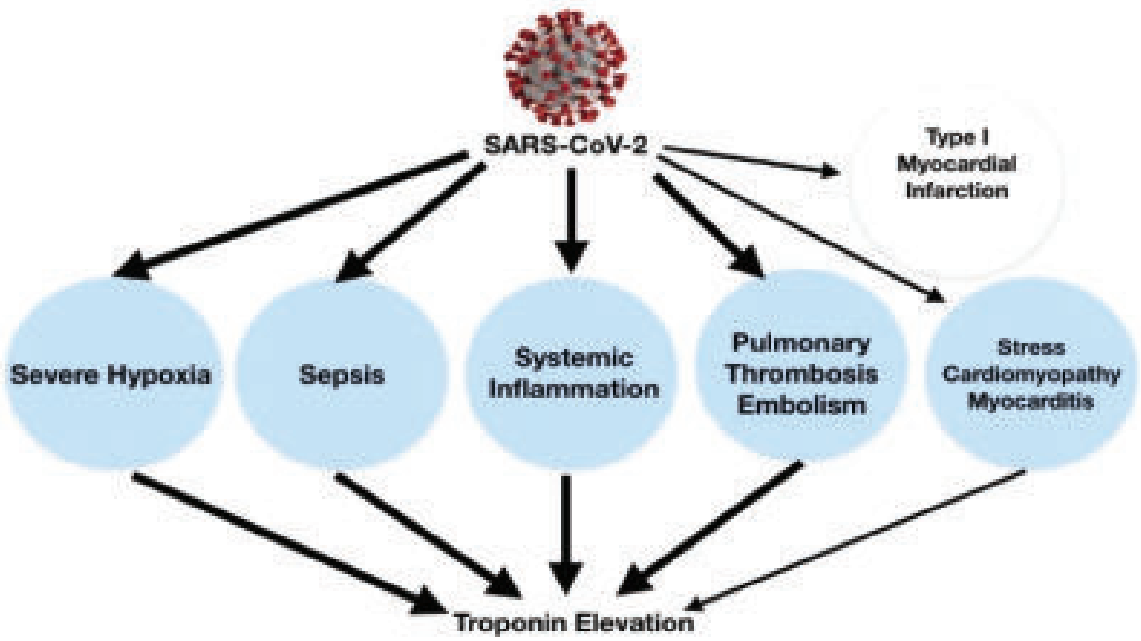

Fig.-4: *Troponin elevation in Covid-19 by non-ischemic myocardial injury(blue circle). Thicker lines underline the most common causes*[38]

the patients having pre-existing cardiovascular or cerebrovascular diseases.[42] In severe Covid-19 patients activation of coagulation pathways has been described which was related with multi-organ dysfunction, leading to increased risk of death in substantial proportion of patients.[43] Covid-19-related coagulopathy has been confirmed by post-mortem studies evident by the presence of thrombotic microangiopathy in several organs, including the coronary vasculature.[44] Recent study showed that the increase in hsTnT levels in Covid-19 was as a result of activation of coagulation /inflammatory pathways and was less attributable to the severity of hypoxia. They also suggest that coagulation pathways and cardiac injury was associated one another and both of them might be related with the risk of mortality in patients with SARS-CoV-2-related pneumonia.[45] Another study also showed that there was an interplay among the biomarkers of coagulation, inflammation and cardiac injury in both critical and non-critical groups of Covid-19 patients.[46]

Conclusion:

SARS-CoV-2 Coagulopathy has a major role in hsTnT elevation and its related mortality in Covid-19. A better understanding of the mechanisms related to Covid-19 might pave the way to therapy tailoring in these high-risk individuals.

Declarations

Acknowledgement:

Scientists and clinical researchers have worked in collaboration to enrich their knowledge and mitigate the global threat of COVID-19 pandemic since it began. In this article, we have taken the step to gather the recent information and have submitted a manuscript for publication.

Conflict of Interests

Authors have no conflict of interests.

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'Double Guide Triple Kissing' for Complex Primary Angioplasty of Distal Left Main Coronary Artery

Arindam Pande[1], Aftab Khan[2], Rabin Chakraborty[3]

Abstract:

A 64-year male, taken for primary PCI, showed totally occluded LAD with distal left main trifurcation stenosis. During the procedure final kissing with 3 balloons were required. In place of upgrading to higher size catheter, we used double guiding catheter technique to accommodate triple kissing. To our knowledge this is the first report of this technique in primary PCI setting.

Key word: Double guide triple kissing, Primary PCI, LMCA trifurcation.

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A 64 years hypertensive male presented with anterior wall myocardial infarction of 4 hours duration. He had ongoing chest pain with blood pressure of 90/60 mm Hg. After initial loading antiplatelet therapy, he was urgently shifted to catheterization laboratory. Angiography (Figure 1) revealed significant ostial stenosis of left anterior descending (LAD) artery followed by thrombotic total occlusion, critical 90% ostial stenosis of fair caliber Ramus Intermedius (RI), 70% ostial stenosis of co-dominant left circumflex (LCX) and a normal right coronary artery. We planned to proceed with primary angioplasty. We started the procedure with a 7 French extra back-up (EBU) guiding catheter through right femoral access; LAD and RI were wired. A 3.5 × 18 mm drug eluting coronary stents (DES) was deployed at mid LAD (Figure 2). Another 4 × 38 mm DES was deployed proximally from left main coronary artery to the mid LAD stent. Post deployment angiogram showed significant plaque shift to LCX with near total occlusion of RI (Figure 3). Stenting of RI (2.75 × 18 mm DES) with balloon at the LCX and LAD (Triple Kiss) was planned. Triple kiss with stent in place require a 9 French guiding catheter. As an alternative, we took a 6 French additional EBU guiding catheter through left femoral access for LCX intervention (Figure 4). Procedure was uneventful with good end result (Figure 5). He is in our follow up for over a year and is completely asymptomatic.

A large-lumen guiding catheter is often used for complex PCI, particularly when kissing-balloon dilation or a 2-stent technique is needed. However presence of peripheral artery disease may hamper negotiation of larger diameter catheter. In these cases taking a second guiding catheter either

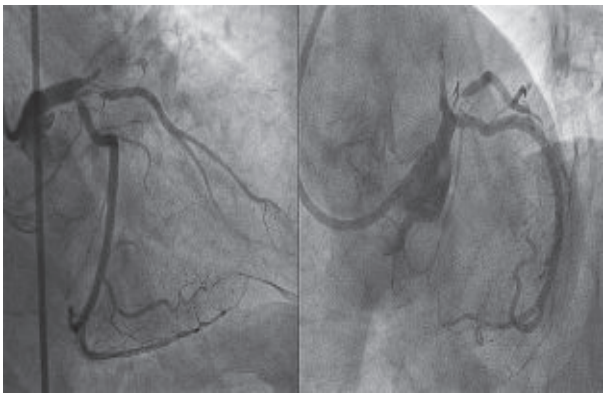

Fig.-1: *Coronary angiography in AP caudal and LAO caudal projections showing significant ostial stenosis of left anterior descending artery followed by thrombotic total occlusion, critical 90% ostial stenosis of fair caliber Ramus Intermedius and 70% ostial stenosis of co-dominant left circumflex artery*

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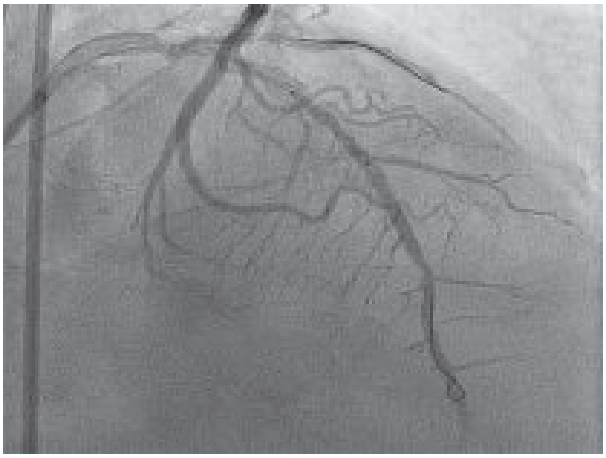

Fig.-2: *Coronary angiography in AP cranial projection showing a 3.5 × 18 mm drug eluting coronary stents is being deployed at mid left anterior descending artery*

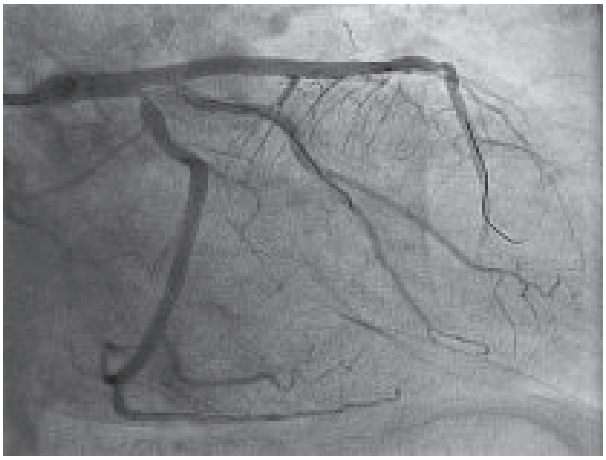

Fig.-3: *Post left main to left anterior descending artery second stent deployment angiogram in AP caudal projection showing significant plaque shift to left circumflex artery with near total occlusion of Ramus Intermedius*

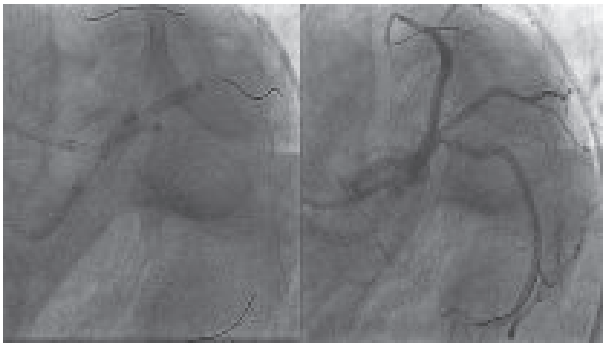

Fig.-4: *Double guide triple kiss with 2.75 × 18 mm drug eluting stent in Ramus intermedius, 3.5 × 9 mm non-compliant balloon at left anterior descending artery and 3 × 9 mm non-compliant balloon at left circumflex artery. Second panel shows post triple kissing coronary angiography in LAO caudal projection.*

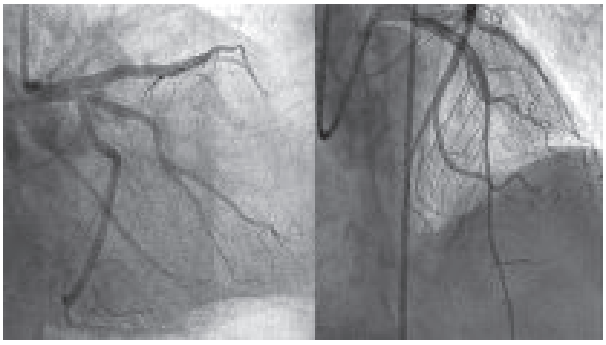

Fig.-5: *Final coronary angiography in AP caudal and AP cranial projections.*

through radial or the opposite femoral access is a novel option.[1] This technique may also be useful in coronary artery perforation where balloon in the first guiding catheter is kept inflated to prevent cardiac tamponade and a second guiding catheter is taken for delivery of covered stent.[2] Another use of this technique is when a small-lumen guiding catheter is used initially for PCI but a 2-stent or 3-balloon technique is deemed necessary during the procedure as in our case. To our knowledge, using a double guiding catheter technique is not yet reported in primary PCI setting.

Conflict of Interests

Authors have no conflict of interests.

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