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CONTENTS

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INSTRUCTION TO AUTHORS

A. Introduction

Bangladesh Heart Journal is the official journal of Bangladesh Cardiac Society, and accepts articles for publication from home and abroad. This is a biannual, peer-reviewed journal and aims to publish work of the highest quality from all sub-specialties of cardiology and cardiovascular surgery. The aim of the publication is to promote research in Bangladesh 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. Three 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). Numberof 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 10 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 Bangladesh Heart Journal 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 upto 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 areappropriate, 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 Bangladesh Heart Journal 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 Bangladesh Heart Journal and suggestions may be made to the authors by the Editorial Board to improve the scientific value of the journal.

D. Editorial Process

The Bangladesh Heart Journal 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. Bangladesh Heart Journal follows the guidelines on editorial independence produced by the International Committee of Medical Journal Editors (ICMJE). All manuscripts correctly submitted to the Bangladesh Heart Journal 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 the Bangladesh Heart Journal, 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 the Bangladesh Heart Journal 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 lower case 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 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

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;42Suppl 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;66Suppl 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. ProcNatlAcadSci 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.

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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Editorial

Ejection Fraction: Do You Know Your Number?

M Atahar Ali

(Bangladesh Heart Journal 2017; 32(2) : 63-64)

Over the last 30 years, improvements in treatment and their implementation have improved survival and reduced the hospitalization rate in patients with heart failure (HF), although the outcome often remains unsatisfactory. The most recent European data (ESC-HF pilot study) demonstrated that 12-month all-cause mortality rates for hospitalized and stable/ambulatoryHF patients were 17% and 7% respectively and the 12-month hospitalization rates were 44% and 32% respectively. The prevalence of this disease is approximately 1-2% IN adult population in developed countries. The life time risk of HF at age 55 is 33% for men and 28% for women.

The main terminology used to describe HF is based on left ventricular ejection fraction (LVEF). On the basis of ejection fraction (EF),HF comprises a wide range of patients, from those with normal LVEF(typically considered ase"50% called HF with preserved EF,HFpEF) to those with reduced EF (typically considered as <40% called HF with reduced EF, HFrEF). Patients with LVEF in the range of 40-49% represent a grey area which is now defined as HF with mildly reduced EF (HFmrEF).[1]

LVEF is such an important parameter that most clinical trials published after 1990 selected patients based on LVEF (usually measured using echocardiography). Thus differentiation of patients based on EF is important due to different underlying aetiologies, demographics, co-morbidites and response to therapies.

Virtually all forms of acquired heart diseases may be associated with abnormalities of systolic function at some point in their natural history. LVEF is thecornerstone of risk evaluation and management in most cardiac diseases. This simplest and most widely used parameterprovides valuable prognostic information, plays a crucial role in selection of medical therapy as well as device based therapy and is instrumental in determining the timing of surgery for structural heart disease.[2,3]

The EF is considered important in HF, not only because of its prognostic importance (the lower the EF the poorer the survival)but also becausemost clinical trials selected patients based uponEF.[4] Although different modalities of EF measurement used in different clinical trials, SCD-HeFT trial shows thatsurvival did not differ according to modality of EF assessment like radionuclide angiography, echo-cardiography or contrastangiograms.[7]It helps to determine the best course of treatment like choice of anti-arrhythmic drugs, selection of patient for device therapy.

It is a predictor of sudden cardiac death (SCD). Patients with LVEF < 35% have high risk of SCD as they are prone to develop malignant arrhythmia. So to prevent SCD and to improve quality of life by implantation of implantable cardioverter defibrillator (ICD) or cardiac resynchronization therapy (CRT), LVEF is an important factor to select the patient.[1] It is also astrong predictor ofpersistent LV dysfunction and a grave long-term prognostic factor following acute myocardial infarction(AMI) (EF<40% raises 2.47 times the risk of death during the first year after MI and nearly 2 times during the 5-year follow-up).[8]

Severely decreased (<30%) LVEF itself is an independent predictor of perioperative outcome and a long-term risk factor for death in patients with HF undergoing elevated-risk noncardiac surgery. Survival after surgery for those with a LVEF d"29% is significantly worse than for those with a LVEF >29%.[5]

In spite of wide use of EF, it has a number of important limitations. The usefulness of EF is sometimes undermined by its strict cut-offs and also by variability of measurement in multiple techniques as well as by inter-observer and intra-observer variability. The long-standing emphasis on EF is misguiding. EF is erroneouslyassumed to be a measure of myocardial contractility.[6]

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Despite its limitations, quantifying EF is accepted by the cardiology community. The evidence-base for modern cardiology is so heavily based on this simple measurement that it is unlikely to disappear. The ubiquitous presence of cardiovascular diseases in currently-aging societies mandates an inexpensive, widely available test that is able to provide hemodynamic assessmentand it became the identity of every cardiac patient as the mobile number of individual person. So the wide use of EF suggests that more formal quality control, automation, and quantitation may be desirable.[3]

Estimation of prognosis for morbidity, disability and death helps patients, their families and clinicians to decide the appropriate type and timing of therapies. In recent decades several multivariate prognostic risk scores have been developed on the basis of EF for different populations of patients with HF and some are available as interactive online applications. Thus LVEF has become a social number and it is more important than mobile number to a heart failure patient. Not only for HF but also it is a cornerstone of risk evaluation and management in most cardiac diseases.

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Original Article

Pattern of Cardiovascular Drugs Use in Outpatient Department in a Tertiary Care Hospital of Bangladesh

Udoy Shankar Roy[1], A K M Monwarul Islam[2], Mohsin Ahmed[3], Murshidur Rahman Khan [4], Nihar Ranjan Sarker[5]

Abstract

Objective: The objective of the present study was to provide recent population-based information on use of cardiovascular drugs in outpatients in a tertiary care hospital of Dhaka, Bangladesh.

Methods: A prospective study of cardiovascular prescriptions of Outpatient Department of Department of Cardiology of Shaheed Suhrawardy Medical college hospital Dhaka, Bangladesh was carried out.

A total of 215 prescriptions were collected for the study in Shaheed Suhrawardy Medical College Hospital Dhaka, Bangladesh from July 2015 to June 2016. The prescriptions were evaluated for rationality based on WHO model list of essential medicines. The prescriptions were critically analyzed using predetermined parameters.

Results: Out of 215 prescriptions collected, 120 drugs were found to be repeatedly prescribed. The results revealed that all single dose formulations prescribed were rationally in accordance with WHO essential drug list whereas fixed dose combinations prescribed remain questionable. A pattern of polypharmacy was clearly evident.

Conclusion: Medications are a critical modality for prolongation and improved quality of life. Campaign and intervention should be focused on patients with more than three diagnostic cardiovascular conditions in order to minimize polypharmacy in patients particularly elderly.

Keywords: Cardiac, Medicine, Prescriptions, Bangladesh.

(Bangladesh Heart Journal 2017; 32(2) : 65-69)

Introduction

Rational drug prescription is defined as use of least number of drugs to obtain the best possible effect in shortest duration and at a reasonable cost. Rationality of drug prescriptions has been studied in various developing countries[1]. Rational Use of Drugs as defined by the World Health Organization (WHO)[2] depends on making correct diagnosis and prescribing appropriate drugs in adequate doses. Globally more than 50% of drugs are prescribed, dispensed or sold inappropriately[3]. Conveyance of message from prescriber to a patient is referred to as prescription writing. The various unintended outcomes that may

occur as a result of poor prescribing approach include ineffective treatment and exacerbated illness along with distress and harm to the patient with higher cost[4].

The quality of health care may depend on many activities which may include the correct diagnosis, rational use of drugs in correct doses and dispensing them with proper direction[5]. During internship, medical

graduates prescribe drugs and provide patient care under the guidance of their teachers. This is the period when they

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should form the habit of correct methods of prescribing appropriate drugs in correct doses. They should be encouraged to prescribe essential drugs[6]. Inappropriate prescription culminates in the increase in the cost of medical treatment and in morbidity and mortality. Irrational prescription of drugs also leads to an increase in incident of adverse drug events and to emergence of drug resistance[7]. Monitoring of prescriptions and drug utilization studies can identify the problems and provide feedback to prescribers so as to create awareness about irrational use of drugs. The present study aimed to assess the prescribing patterns of cardiovascular drugs in cardiology outpatient department of Shaheed Suhrawardy Medical College Hospital, Dhaka, Bangladesh

Methods:

A prospective study was conducted with the consent of Head of the Department of Cardiology in Shaheed Suhrawardy Medical College Hospital, a 750 bedded tertiary care teaching hospital, Dhaka, Bangladesh.

The prescriptions were collected for a period of twelve months from July 2015 to June 2016 from the outpatients suffering from cardio vascular health problem from the hospital outpatient department (OPD) on daily basis including repeated (refilled) prescriptions. A total of 215 prescriptions were collected for the study undertaken.

Each prescription was critically studied for the patient's demographic information (such as patient name, age, gender, address, date of consultation) and drug name, dose strength, dosage form, frequency, duration and quantity. The drugs prescribed in each prescription were carefully noted and following parameters were used to assess the rationality of the prescriptions.

- Segregation of prescription in age wise
- Categorization of drugs prescribed with respective to gender
- Total number of drug prescribed
- Average number of drugs per prescription
- Drug prescribed by brand names versus generic names
- Dosage form
- Duration of therapy
- Therapeutic category
- Number of single dose formulation prescribed
- Number of fixed dose formulation prescribed

Data was analyzed using statistical package for social sciences (SPSS) software version 17. Descriptive statistics was used to analyze the data obtained from the study.

Results:

Observation of the prescriptions revealed that among the total collected prescriptions of cardiovascular disorders, 120 drugs were repeatedly prescribed. Each patient was prescribed with more than three medicines. Polypharmacy was clearly evidenced in most of the prescriptions.

Parameters evaluated for prescribing pattern

Age in years

From the analyzed prescriptions only one prescription was prescribed between the age group of 31 to 39 years. Sixty prescriptions were found to be in the age between 40 to 49 years. Eighty prescriptions were in the age group of 50 to 59 years. The numbers of prescriptions falling into the category of age group between 60 to 69 years were sixty followed by fifteen prescriptions in the category of 70 to 79 years.

Gender

Out of two hundred and fifteen prescriptions reviewed, 150 prescriptions were for male category and the remaining 65 for female.

Drug prescribed by brand versus generic names

Out of 215 prescriptions collected, 120 were repeatedly prescribed among which 90 were of brand names and the remaining were of generic names.

Dosage form

All the cardiovascular drugs prescribed were in oral dosage forms.

Duration of therapy

Among the 215 prescriptions collected 30 were prescribed up to 3 months, 80 prescriptions for 6 months and remaining 105 prescriptions for 1 year.

Therapeutic category

Table 1 and 2 represents the prescribing pattern of cardiovascular drugs in single dose and fixed dose combinations respectively. Most of the drugs prescribed were of single dose formulation along with a few fixed dose combinations. Table 3 and 4 portrays the therapeutic category of cardiovascular drugs in single dose and fixed dose formulation respectively. It is clear that most of the single dose formulations prescribed were of antihypertensives, antianginal and antilipidaemic (Fig 1). From Fig 2 it is clear that anti-platelets and antilipidaemic were the most commonly prescribed in fixed dose combinations.

Determination of rationality

The rationality of cardiovascular drugs has been determined by referring WHO model list of essential medicines (March 2010, 16th list updated) [2]. The results revealed that most of the prescribed single dose drugs are in accordance with the essential model list but the fixed dose combinations prescribed are not included in the list but used commonly.

Table-I

Prescribing pattern of cardiovascular drugs (Single dose formulation)

Cardiovascular Drug	Number of prescriptions	Prescribed pattern (%)
Amlodipine	50	23.25
Atenolol	20	9.3
Atorvastatin	107	49.76
Carvedilol	16	7.44
Digoxin	08	3.72
Olmesartan	39	18.14
Asprin	28	13.02
Glyceryl trinitrate	60	27.91
Mononitrate	42	19.53
Metoprolol	33	15.35
Trimetazidine	04	1.86
Ramipril	32	14.88
Losartan potassium	26	12.09
Verapamil	15	6.97

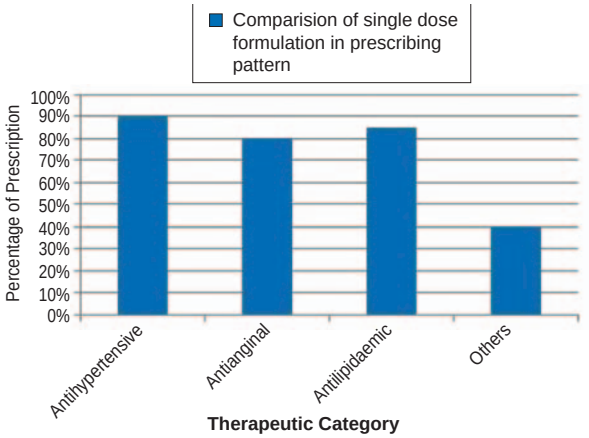

Fig.-1: *Comparison of single dose formulations in prescribing pattern.*

Table-II

Prescribing pattern of cardiovascular drugs (Fixed dose combinations)

Cardiovascular Drug	Number of prescriptions	Prescribed pattern (%)
Amlodipine + Atenolol	06	2.79
Amlodipine + Olmesartan	06	2.79
Aspirin + Clopidogrel	12	5.58
Atorvastatin + Aspirin	12	5.58
Furosemide + Spironolactone	04	1.86
Torasemide + Spironolactone	04	1.86

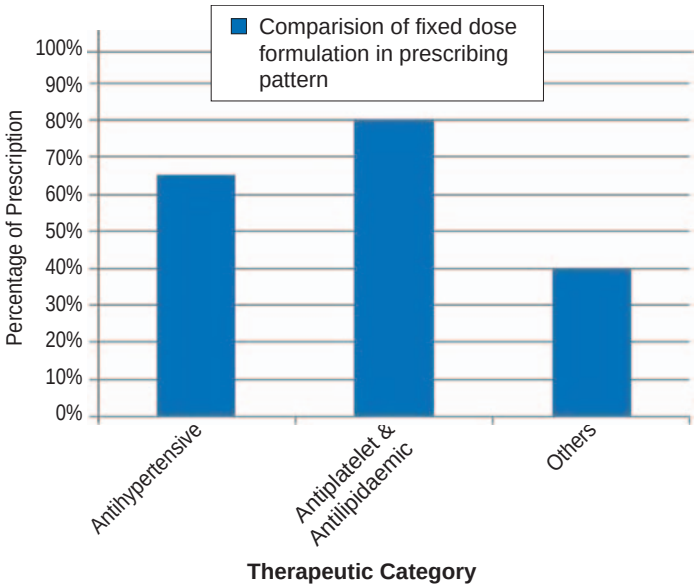

Fig 2: *Comparison of fixed dose formulations in prescribing pattern.*

Table-III

Therapeutic category of cardiovascular drugs (Single dose formulation).

	Pharmacological Classification	Therapeutic Category
Amlodipine	Calcium channel blocker	Antihypertensive
Atenolol	Beta blocker	Antihypertensive
Atorvastatin	*HMG CoA reductase inhibitor	Anti lipidemic
Carvedilol	Beta blocker	Antihypertensive
Digoxin	Cardiac glycoside	Congestive Heart Failure
Olmesartan	ARB	Antihypertensive
Glyceryl trinitrate	Vasodilator	Antianginal and antiarrhythmic
Asprin	Cyclooxygenase inhibitor	Antiplatelet
Isosorbide mononitrate	Vasodilator	Antianginal and antiarrhythmic
Metoprolol	Beta blocker	Antihypertensive
Trimetazidine	Vasodilator	Antianginal and antiarrhythmic
Ramipril	ǫACE inhibitor	Antihypertensive
Losartan potassium	Angiotensin II antagonist	Antihypertensive
Verapamil	Calcium channel blocker	Antihypertensive

*HMG CoA – Hydroxy -3-methyl glutaryl Co-enzyme A; ǫACE – Angiotensin converting enzyme

Table-IV

Therapeutic category of cardiovascular drugs (Fixed Dose Combinations).

Cardiovascular Drug	Pharmacological Classification	Therapeutic Category
Amlodipine + Atenolol	Calcium blocker + beta blocker	Antihypertensive
Amlodipine + Olmesartan	Calcium blocker + ACE inhibitor	Antihypertensive
Aspirin + Clopidogrel	Platelet aggregation inhibitor	Antiplatelet
Atorvastatin + Aspirin	HMG CoA reductase inhibitor + platelet aggregation inhibitor	Antilipidaemic and antiplatelet
Furosemide+Spironolactone	Loop + Potassium sparing Diuretics	Antihypertensive
Torasemide+Spironolactone	Loop + Potassium sparing Diuretics	Antihypertensive

Table-V

Category of patients according to diagnosis

Patients (No.)	IHD	HTN	Post MI Angina	Heart Failure	IHD & HTN	IHD & HF	RHD	CHD	Arrhythmia
Male (150)	54	25	10	11	16	9	12	7	6
Female (65)	19	14	6	5	4	2	8	3	4

Discussion

A prescription by a physician denotes his/her attitude towards the disease and medication[8]. The various prescribing parameters and the distribution of categories of drugs in the prescriptions analyzed in this study provided an insight into the prescribing pattern in Shaheed Suhrawardy medical college hospital, Dhaka,Bangladesh.

Duplication of drug product and cost effectiveness of drugs can be minimized by prescribing drugs in generic names rather than brand names[9]. In this study, most of drugs prescribed were in brand names and it was similar to other type of studies conducted[10]. Higher number of patients in this study was male (Table-5) which correlates with other researchers [11].

It was observed in present study that most of (83.33%) the drugs prescribed were of single dose formulations and 16.66% were of fixed dose combinations. Amlodipine, Glyceryl Trinitrate, Metoprolol, Atorvastatin are the most commonly prescribed drugs found in single dose formulation. Clopidogrel and Aspirin combination was the commonly prescribed fixed dose combination. The high prescribing

frequency of antihypertensives and antiplatelets in single dose formulations and antiplatelet with antilipidaemic in fixed dose combinations reflects the high prevalence of hypertension and cerebrovascular diseases among the study population.

The therapeutic management of cardiovascular problems has to be straight forward[14]. The present study had certain limitations like short period of study and the study did not consider the prescribing pattern at seasonal variations in disease. The plan mooted in this particular study is to perform over a longer period of time with greater number of prescriptions along with improving the scope of prescription pattern among the cardiovascular drugs in Shaheed Suhrawardy Medical College Hospital, Dhaka,Bangladesh.

This study is to provide clinical pharmacy services by preparing treatment guidelines for various cardiovascular diseases and there by assisting physician for better patient care by minimizing polypharmacy, adverse drug reactions and events, drug interactions etc.

Conclusion

Medications are a critical modality for prolongation and improved quality of life. The percentage of drugs prescribed with fixed dose combinations was low. The percentage of drugs prescribed by generic name was low and polypharmacy was observed which may be considered by physicians for evaluation. Irrational prescribing can be better avoided by strictly following to the treatment guidelines and ideal prescription writing. In order to improve the prescription behavior and skill, awareness about rational use of drugs may be created by conducting many workshops[15] and training programme in clinical medicine[1].

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Original Article

Association of Waist-Hip Ratio with Angiographic Severity of Coronary Artery Disease in Patients with Acute ST- Segment Elevation Myocardial Infarction

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Abstract

Objective: Coronary artery disease (CAD) is rising in South Asia and is taking a more malignant proportion in South Asians than in Caucasians. Having a similar socioeconomic and cultural background, the scenario is same in Bangladesh. Obesity, especially abdominal is concerned as an important and modifiable risk factor for CAD which is now also raising both in developed and under developed countries. Waist-Hip ratio (WHR) is considered as an important tool for assessing abdominal obesity. The aim of this study is to evaluate the association between WHR and the severity of CAD of acute ST-segment elevation myocardial infarction (STEMI) patients so that primary prevention, early detection and proper management strategy can be taken to reduce the disease burden, morbidity and mortality.

Methods: This cross sectional observational study was carried out among 105 patients with acute STEMI who received thrombolytic and underwent coronary angiography (CAG) at National Institute of Cardiovascular Diseases (NICVD), Dhaka from May, 2016 to November, 2016. They were divided into two groups, Group I (normal WHR) = 51 and group II (increased WHR) = 54, according to WHR level. Angiographic severity of coronary artery disease was assessed by vessel score and Genseni's score.

Results: Significant positive correlation was found between WHR and vessel score (r= 0.62, p=0.003). Moderate to severe CAD patients were significantly higher in increased WHR group than in normal WHR group (77.8% vs. 29.4%, p=<0.001). Significant positive correlation was also found between WHR and Genseni's score (r= 0.71, p=0.001). Logistic regression analysis showed that a patient with increased WHR had 2.75 times higher risk of having significant CAD compared with those with the normal WHR.

Conclusions: Increased WHR group had more significant coronary artery disease in terms of vessel score and Genseni's score and can be considered as a predictor of the severity of the CAD disease in acute STEMI patients.

Keywords: Myocardial infarction, Waist-Hip ratio, Coronary Angiography.

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Introduction:

CAD is a common and leading cause of death throughout the world.

In Bangladesh it is also an increasingly important medical and public health problem, and is the leading cause of mortality. National data on incidence and mortality of CAD are few in Bangladesh. More recent data indicates the CAD prevalence is 1.85% to 3.4% in rural population and it is 19.6% in an urban population[1]. Obesity has an association with cardiovascular disease (CVD), diabetes and is an important component of metabolic syndrome[2]. Central obesity is more strongly associated with CVD risk than general obesity[3].

The deposition of adipose tissue is associated with systemic inflammation which has a direct effect on CAD risk[3]. Visceral adipocytes have high lipolytic activity and produce free fatty acids and glycerol, which are drained by the portal vein into the liver, where they increase triglyceride and glucose production, decrease insulin clearance and may cause hepatic steatosis[4]. Moreover, visceral adipocytes differ from subcutenaeous adipocytes in their release of secrotory proteins potentially protective for diabetes and CAD (adiponectin, leptin,glycogen synthase and peroxisome proliferator activated receptor-gamma) show lower expression levels in visceral than subcutaneous tissue[5]. Currently used general and central obesity anthropometric measures for assessing adiposity related risk include body mass index (BMI), waist circumference (WC), hip circumference (HC), waist-hip ratio (WHR) and waist-height ratio (WHtR)[3]. BMI is often used to reflect total obesity, whereas the WC, WHR and WHtR are used as surrogates for intra abdominal adiposity[6]. BMI does not differentiate between fat and fat free mass so for is inadequate for identifying individuals at increased risk of CAD[3]. Waist and hip circumferences measures different aspects of body composition and fat distribution and have independent and often opposite effects of CVD risk factors[7]. The larger waist circumference may be associated with a higher risk of developing CVD or cardiovascular mortality. Interestingly, larger hip circumferences, suggesting peripheral fat deposition, have been associated with less severe CVD risk factors or a lower risk of incident CVD. Because of the opposing effects of waist and hip circumferences, the WHR has become a popular method of assessing atherogenic risk[8]. But the choice to use WC or WHR as an indices of abdominal obesity may depend on the setting, as in a physicians' office it is more feasible to measure WC, whereas in research studies, it appears to be more informative to measure WHR[9]. Based on a number of studies, it is clearly suggested that indices of abdominal obesity is more consistently and strongly predictive of coronary heart disease than BMI[10-13].

Computed tomography scan (CT scan) and Magnetic resonance imaging (MRI) are accurate for measuring body composition but they are too expensive to be performed for this alone[14]. Moreover, sonographically based obesity measurement are not superior to anthropometric indices in predicting the presence CAD[15]. Coronary angiography is undoubtedly the most sensitive and specific method available for assessing CAD. It also has the advantage that even minor atherosclerotic lesions at a subclinical stage can be detected and may become a target for preventive and therapeutic interventions[16]. Several studies also demonstrated that WHR had strong relation with angiographic severity CAD both in men and women[16-21].Methods

This cross sectional observational study was carried out among 105 patients with acute STEMI who received thrombolytic and underwent CAG at NICVD, Dhaka from May, 2016 to November, 2016. Acute STEMI patients who were not thrombolysed, not subjected to do CAG, with previous H/O percutaneous coronary intervention (PCI), coronary artery bypass grafting (CABG), systemic infection and non-cardiovascular diseases (like hepatic dysfunction, CKD, malignancy) and who had participated in weight-reducing programs (including diets) or received related medications were excluded from the study. Data collection was done after taking informed written consent from each patient or from legal guardian who fulfilled the criteria. They were divided into two groups, group I (normal WHR, Male < 0.90, Female < 0.80) = 51 and group II (increased WHR, Male >0.90, Female >0.80) = 54 according to inclusion and exclusion criteria.

Acute STEMI was diagnosed by third universal definition of Myocardial Infarction[22]. Demographic profile (age, sex, occupation and risk factors of myocardial infarction like diabetes, hypertension, dyslipidaemia, smoking, family history of CAD), drug history, pulse, BP and other vital parameters were recorded and routine laboratory investigations were done during admission. Base line investigations for CAG, height, weight, waist circumference and hip circumference were measured day before CAG. Height was measured while standing with four parts (heels, buttocks, back and head) touching the mechanical beam balance on the backing board heels together without shoes and head in Frankfurt plane wearing light clothing only. Weight was measured by a standard medical scale after removal of shoes and wearing light clothing only. Waist circumference was measured at the midpoint between the lower margin of the least palpable rib and the top of the iliac crest, using a stretch resistant tape at the end of a normal

expiration. Hip circumference was measured around the widest portion of the buttocks, with the tape parallel to the floor. World Health Organization (WHO) definition of central obesity (for Asians) as measured by WHR was used for defining the abdominal obesity[23]. CAG was done during same hospital stay. Angiographic severity of CAD was assessed by vessel score and Gensini's score. Gensini's score 36 points was regarded as cut-off value for CAD severity (Gensini's score < 36 points – absent or mild coronary atherosclerosis, Gensini's score > 36 points – medium to severe coronary atherosclerosis)[24].

Ethical clearance was taken from ethical review committee, NICVD, Dhaka. Data were analyzed by using statistical package for Continuous data was expressed as median or mean ± SD. Dichotomous data was expressed as percentage. Comparison of continuous variables was done by unpaired t-test, as appropriate. Categorical data was analyzed with Chi-square test. Fisher's exact test and ANOVA tests were used as applicable. The significance of the results as determined in 95% confidence interval and a value of P < 0.05 was considered to be statistically significant. Spearman's rank correlation coefficient test, Pearson's correlation coefficient test and logistic regression analysis were used as appropriate.

Results:

The mean age of the studied patients were 50.9±8.7 years ranging from 28 to 75 years. The mean age of group II was more than group I (52.37±9.64 vs. 47.80±9.83 years; p=0.11). Male patients were predominant in both groups. Male female ratio was 6:1. Among the risk factors hypertension, dyslipidaemia, diabetes mellitus were significantly higher in group II than group I (p=0.03, 0.001, 0.02). The mean WHR of group II and group I was 0.98±0.05 and 0.86±0.04 (0.99±0.034 and 0.88±0.008 was in male and 0.92±0.033and 0.78±0.007 was in female). Mean BMI of group II and group I was 26.17±1.75 (kg/m^2) and 24.02±1.97 (kg/m^2). Mean Waist circumference was found in group II and group I was 92.61±7.12 and 81.33±4.80 cm. The mean WHR was increased in proportion with the number of vessel involved from no vessel involvement to triple vessel involvement (0.86±0.005, 0.88±0.06, 0.94±0.05 and 0.99±0.07 respectively, p=<0.001). Significant positive correlation was found between WHR and vessel score (r= 0.62, p=0.003). Moderate to severe CAD patients were significantly higher in increased WHR group than in normal WHR group (77.8% vs. 29.4%, p=<0.001). The mean WHR in moderate to severe CAD was 0.96±0.07 and normal to mild CAD was 0.88±0.05 (p=<0.001). The mean Genseni's score was found 57.55±28.8 and 26.20±.13.96 in group II group and I. The difference of mean Genseni's score between two groups was statistically significant (p=<0.001). Significant positive correlation was also found between WHR and Genseni's score (r= 0.71, p=0.001). Logistic regression analysis showed that patient with increased WHR had 2.75 times higher risk of having significant CAD compared with those with the normal WHR.

Table - I

Demographic profile of study population (n=105)

	Group I (n= 51)	Group II (n=54)	p value
Age in years(Mean ±	49.5±8.9	52.2±8.3	0.11^{NS}
SD)	(28-70)	(35-75)	
(Range)			
Gender			
Male	43(84.3%)	47(87.0%)	0.69^{NS}
Female	8(15.7%)	7(13%)	
Risk factorsSmoking	29(56.9%)	34(63.0%)	0.52^{NS}
Hypertension	17(33.3%)	24(44.4%)	0.03^{S}
Diabetes mellitus	11(21.6%)	28(51.9%)	0.001^{S}
Dyslipidaemia	18(35.3%)	31(57.4%)	0.02^{S}
Family H/O of CAD	6(11.8%)	9(16.7%)	0.74^{NS}
Anthropometric status			
(Mean ± SD)	0.86±0.04	0.98±0.05	<0.001^{S}
Waist-hip ratio	0.88±0.008	0.99±0.034	<0.001^{S}
Male	0.78±0.007	0.92±0.033	<0.001^{S}
Female	24.02±1.97	26.17±1.75	<0.001^{S}
Body Mass Index (kg/m^2)	81.33±4.80	92.61±7.12	<0.001^{S}
Waist circumference (cm)			

SD – Standard deviation, NS - Not significant, S - significant

Table - II

Distribution of the study population according to vessel score (n=105)

Vessel Score	Group I (n=51)	Group II(n=54)	p value
Score – 0	5.9%(3)	0.0%(0)	0.07^{NS}
Score – 1	56.9%(29)	22.2%(12)	<0.001 ^{S}
Score – 2	31.4%(16)	50.0%(27)	0.04^{S}
Score – 3	5.9%(3)	27.8%(15)	0.003 ^{S}

Table - III

Association between WHR and number of vessels involvement (n=105)

No. of vessel involved	Waist-hip Ratio (WHR)		p value
	Mean	SD	
No vessel involvement (n=3)	0.86	0.005	
Single (n=41)	0.88	0.06	
Double (n=43)	0.94	0.05	<0.001 ^{S}
Triple (n=18)	0.99	0.07	

Table - IV

Distribution of the study population according to CAD severity by Genseni's score (n=105)

CAD severity by Genseni's score	Group I	Group II	p value
Moderate to severe (≥36 points)	29.4%(15)	77.8%(42)	<0.001 ^{S}
Normal to mild (<36 points)	70.6%(36)	22.2%(12)	
Mean ± SD	26.20±.13.96	57.55±28.82	<0.001 ^{S}

Table -V

Mean status of WHR of the study population according to significant coronary artery disease defined by Genseni's Score (n=105)

WHR	Moderate to severe CAD (n=57) (GS≥36)	Normal to mild CAD (n=48) (GS<36)	p value
Mean±SD	0.96±.07	0.88±0.05	<0.001^{S}

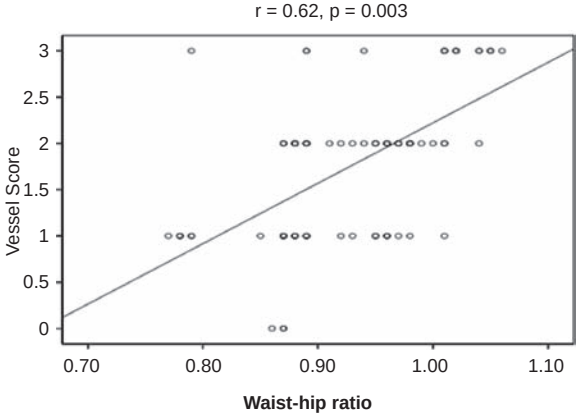

Fig.- 1: *Correlation between WHR and vessel score*

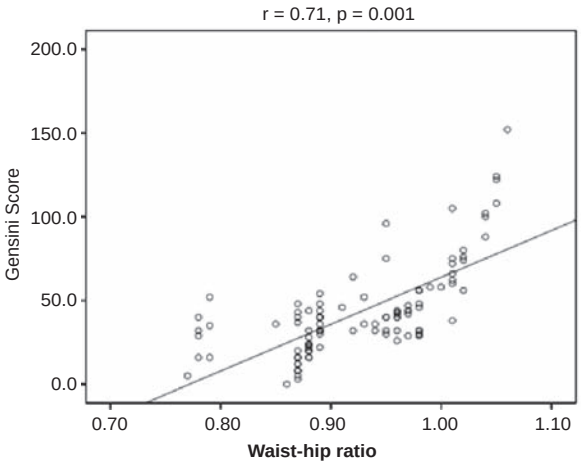

Fig.- 2: *Correlation between WHR and Genseni's score*

Table -VI

Multivariate logistic regression of determinants of significant CAD (by Genseni's Score).

Variables of interest	β	S.E.	p value	OR	95% CI
Age (>50yrs)	0.141	0.034	0.10^{NS}	1.17	0.109 -1.921
Smoking	0.099	0.017	0.49^{NS}	0.61	0.220 – 1.414
Diabetes mellitus	0.666	0.350	0.03^{S}	2.49	1.55 – 5.201
Hypertension	0.489	0.299	0.04^{S}	2.31	1.241 – 4.724
Dyslipidaemia	0.600	0.401	0.04^{S}	2.25	1.405 – 3.112
Increased WC	0.233	0.147	0.04^{S}	1.20	1.123 – 2.190
Increased BMI	0.458	0.239	0.03^{S}	1.47	1.099 – 3.912
Increased WHR	0.534	0.366	0.03^{S}	2.75	1.200 – 4.979

Dependent Variable: Genseni's Score;
Independent Variables: Age, smoking, diabetes mellitus, hypertension, dyslipidemia, increased WC, increased BMI, increased WHR
S.E.- Standard Error, OR- Odds Ratio. CI- Confidence Interval.

Discussion:

The age and sex distribution of the studied patients were very close to other relevant studies[25-27]. Majority of them were in the range of 41-50 and 51-60 years. The mean age of the studied patients was 50.9±8.7 years ranging from 28 to 75 years. The mean age of group II was more than group I (52.37±9.64 vs. 47.80±9.83 years) but the difference between two groups was not statistically significant (p=0.11). In group I, 43 (84.3%) patients were male and 8 (15.7%) patients were female. In group II, 47 (87%) patients were male and 7 (13%) were female. Male female ratio was 6:1 which indicates male patients were predominant in this study. No significant association (p=0.69) was found between the groups in terms of sex distribution. As females were given less attention and access for them to health care facilities was limited particularly in low socioeconomic population like our country may contribute this male predominance.

Among the study population, highest percentage had history of smoking (60%) followed by dyslipidaemia (46.7%), hypertension (39.0%), diabetes mellitus (37.1%) and family history of CAD (14.3%). It was found that hypertension, diabetes mellitus and dyslipidaemia were significantly higher in group II than group I (p=0.03, 0.001, 0.02). The rest of the risk factors had no significant association between study groups (p>0.05). Akanda, et al. [25] found most prevalent risk factors were smoking (60%) and dyslipidaemia (60%) followed by hypertension (35%) and diabetes mellitus (10%) in Bangladeshi population having CAD. Kumar, et al. [28] found 40.40% were diabetic, 45.72% were hypertensive and family history of CAD were present 14.54% in Indian population having AMI. These differences might be due to variation in the life style, degree of motivation and level of education.

The mean WHR was observed 0.98±0.05 and 0.86±0.04 in group II and group I respectively. In case of male and female of the studied patients in group I it was observed 0.88±0.008 and 0.78±0.007 and in group II it was 0.99±0.034 and 0.92±0.033. The differences between them were statistically significant (p<0.05). Mean BMI of group II was 26.17±1.75 (kg/m^2) and that of group I was 24.02±1.97 (kg/m^2). Mean WC of group II and group I was 92.61±7.12 cm and 81.33±4.80 cm.

Vessel score 1 was significantly higher (56.9% vs. 22.2%) in group I than group II (p=<0.001) where vessel score 2 and vessel score 3 were significantly higher in group II than in group I (50.0% vs. 31.4% and 27.8% vs. 5.9%; p=0.04, 0.003) respectively.

The mean WHR of subjects with angiographically normal, single, double and triple vessel disease were 0.86±0.005, 0.88±0.06, 0.94±0.05 and 0.99±0.07 respectively. It was increased in proportion with the number of vessel involved from no vessel involvement to triple vessel involvement and the differences were statistically significant (p=<0.001). Ahmad, Khan and Khan found that the WHR was abnormally increased in 65% of patients with CAD[2].

Moderate to severe CAD in terms of Genseni's score was significantly higher (77.8% vs 29.4%) in group II than in group I (p=<0.001). It was also found that the relative risk of CAD was approximately twice in the group with increased WHR than among normal WHR (RR= 3.06, CI=1.831 – 5.122, p=<0.001). It was almost similar to another study[2].

The mean Genseni's score was found 57.55±28.8 and 26.20±.13.96 in group II group and I respectively. The difference of mean Genseni's score between two groups was statistically significant (p=<0.001). Bakhoum, et al. [29] found that the mean Genseni's score was 85.1±38.5 vs. 60.4 ± 43.6 in patients with or without abdominal obesity in terms of WC respectively that indicated that Genseni's score was higher in abdominal obese than normal population.

The mean WHR was found 0.96±0.07 and 0.88±0.05 in moderate to severe and normal to mild CAD respectively and was statistically significant (p=<0.001). Similar finding was evaluated by Parsa and Jahanshahi[21].

Regarding correlation coefficient between WHR and the severity of CAD as assessed by Genseni's score, it was found that WHR(r=0.71) had the significant positive correlation. It was supported by another study[2].

Multivariate analysis revealed that diabetes mellitus, hypertension, dyslipidaemia, increased WC, increased BMI and increased WHR were found to be the significant predictors of severe CAD with ORs being 2.49, 2.31, 2.25, 1.20, 1.47 and 2.75 respectively. Thus the WHR was found to be more strong predictor of the severity of CAD. This result was comparable with the study of Parsa and Jahanshahi[21].

Conclusions:

Increased WHR was significantly associated with the angiographic severity of coronary artery disease in patients with acute STEMI. Significant positive correlation was observed between the vessel score and WHR. Similarly WHR levels were found to be higher in patients with high degree of angiographic stenosis in terms of Genseni's score. Logistic regression analysis showed that a patient with increased WHR had 2.75 times higher risk of having significant CAD compared with those with the normal WHR. So, abdominal obesity, as evidenced by increased WHR, may be considered as a predictor of the severity of CAD in patients with acute STEMI.

Limitations of the study:

This was non-randomized study. The sample size was small and the study was carried out in one centre. Angiography was evaluated by visual estimation, so there was chance of inter observer and intra observer variation of interpretation of the severity of the stenosis.

Disclouser:

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Original Article

Outcome of CABG with or without Coronary Endarterectomy in Bangladesh: A Retrospective Cohort Study

Redoy Ranjan[1], Dipannita Adhikary[2], Heemel Saha[3], Sabita Mandal[4],Sanjoy Kumar Saha[5], Asit Baran Adhikary[6].

Abstract:

Objective: In this review, we assess the outcome of surgical revascularization technique, coronary artery bypass grafting (CABG) with or without coronary endarterectomy (CE) for patients with diffuse coronary artery disease in a single surgeon's practice.

Methods: We retrospectively reviewed 2189 patients who experienced OPCABG with or without CE between January 2009 and December 2016. The following variables were compared in this study- Intubation time, ICU stay, Postoperative MI, Arrhythmia, renal impairment, stroke and ICU mortality.

Results: Of 2189 patients, 1000 patients required coronary endarterectomy in addition to OPCABG. Initially, there was a higher mortality rate and incidence of postoperative blood transfusion in the group of patients who had CE in addition to CABG, with no significant difference in other outcomes. But postoperative use of Heparin, Warfarin and Double antiplatelet agent was associated with decreased mortality significantly in our study. In comparison to other group, the patients in the combined CE with CABG group had a higher incidence of male sex, past MI, and poor left ventricular function. However,emergency CABG, renal impairment, poor left ventricular function, and also peripheral vascular disease were associated with higher mortality in both group of the patients; CE was not a predictor of postoperative mortality.

Conclusions: Total surgical revascularization is attainable and accomplishes, when Coronary endarterectomy is performed in addition to Off-pump coronary artery bypass graft in patients when there is no other choice for satisfactory revascularization.

Key words: Endarterectomy, Coronary Artery Disease, Coronary Artery Bypass Grafting.

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Introduction:

In the late 1950s, Coronary endarterectomy was at first described as a surgical technique for myocardial revascularization[1].Endarterectomy is the removal of the atheromatous plaque through a plane between the external media and adventitia layers, along these lines restoring the lumen to the supply distal part of artery. In patients with diffuse coronary artery disease, coronary endarterectomy is frequently performing to attain complete myocardial

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revascularization.Diffuse coronary artery disease can make sufficient surgical treatment troublesome or even forestall it completely. In these cases,conventional CABG does not provide a satisfactory myocardial revascularization, bringing it about incomplete CABG[1]. However, inadequate revascularization does not influence the quick death rate, but rather increase the incidence of reoperations with significant obstruction in vessels, which influences the long termcardiac function. These patients have repeated attach of angina,more frequent work absence rate, poor performance in stress tests and also needan early coronary re-intervention, but complete CABGgroup of patients have better survival rate[2,3,4].

Ischemic heart disease (IHD) patients, who are referred for CABG(coronary artery bypass graft) surgery are getting more complex with multiple comorbidities, like hypertension, diabetes, renal impairment, and peripheral artery disease, also a big portion of this group of patients have experienced previous Coronary intervention angioplasty. Subsequently, patients referred for CABG regularly have progressed and diffuse coronary artery disease, which has made complete surgical revascularization more difficult. This study evaluates the consequences of coronary endarterectomy (CE) in a single surgeon's practice at our institute and to provide details regarding our treatment strategies for patients experiencing diffuse coronary artery disease.

Methods:

From January 2009 to December 2016, 2189 patients were evaluated to CABG with or without CE in a single surgeon's practice. We review the outcome of study population by survival rate, Post-operative MI, post-operative cardiovascular and neurological event, re-intervention, hemodynamic instability, NYHA class and Canadian class for angina were researched. However, there was a measurable distinction in regard to the previous infarcted area is shown in Table-1 with the pre-operative variables from the patients.During this study, every patient was reached either during OPD visit (outpatient department) or by phone call and data was gotten through the reactions to a data sheet.

Surgical procedure:

All procedures were performed through a standard median sternotomy. After the conduits (internal mammary artery, radial artery, and the saphenous vein) were harvested, heparin was used to maintain an ACT (Activated clotting time) more than 400 seconds. Almost all the operations were performed off pump CABG and a few cases required the assistance of cardiopulmonary bypass (CPB), using a membrane oxygenator, utilizing the surgical procedures to acquire the graft[4].We utilized mechanical stabilizers, the compression typeand suction type to immobilize the target coronary artery during grafting. Final decision to endarterectomize a coronary artery was made intraoperatively and it depends on technical contemplations. Coronary endarterectomy was considered,when the targeted artery was completely or almost impeded with long segment stenosis and severely calcified plaques.

Utilizing the closed methods, coronary endarterectomy was performed manually by slow sustain and continuous traction of atheromatous plaque with the aid of Ring Forceps, trailed by reproduction with anastomosis with pre-planned graft. The CE was performed when localized lesion blocked a sufficient distal stream, distal diffuse lesion or multi-segmental lesion; or when a calcified or extremely thick plaque burst, making anastomosis troublesome or hindering the stream. The arteriotomy was approximately 8-10mm long, however that was extended out for another 5mm in few cases, if complete removal of the plaque was not feasible. Exceptionally sensitive ring forceps were utilized to build up a plane between the media lamina and the atherosclerotic plaque. Much consideration was paid to the entire expulsion of the distal segment but proximal traction of the plaque was avoided; because of the danger of competitive flowloss between the graft and the native artery that may steal blood flow through the graft. To ensure complete expulsion of the distal atheroma, the atheromatous plaque carefully inspected for a smooth distal tapper end (Figure-1). In addition, back flow of blood from the distal vessel following extraction of the atheroma is a consoling indication of adequate removal atheromatous plaque and that is special feature in OPCABG endarterectomy. Every cases were performed with single arteriotomy incision and longest atheroma was 14cm in size (Figure-1) in our study.

Postoperatively, every patientwas closely observed in ICU with ECG, ABG Analysis, FBC, S. creatinine, LFT, Chest X-ray and also CK-MB was performed where indicated. Every patient got Heparin bridging to Warfarin from the first post-operative day for six months and also usedoral combination of Clopidogrel with Aspirin (75 mg) to anticipate acute thrombosis at the graft and in the endarterectomies artery. Usually Warfarin started with 10mg daily for first three post-operative days followed by 5mg till 6 months post-operatively and dose adjusted according to INR (Targeted INR 1.5-2.5).

Results:

Total 2189 number of patients were studied in this review. However, 1189 patients underwent only CABG (Group-1) and 1000 patients underwent CE with CABG (Group-2) (Figure-3). Twelve hundred endarterectomies were performed in Group-2, shown in a pie chart (Figure-4).

16.5% of the patients required multiple endarterectomies (1.2 endarterectomies per patient). Of the 1200 endarterectomies, 75.1% were performed in the left coronary territory and 24.9% were performed in the right coronary territory. The mean number of graft were 3.02±0.15 in only CABG group and 3.28±0.25 in CE with CABG group. The mean follow-up period was 8.5±3.5 months (between of 6 to 24 months). The quantities of graft and endarterectomies are appeared in Table 2. There were 18.5% conversions to on-pump CABG using cardiopulmonary bypass in CE with CABG Group but only 2.78% conversions to on-pump CABG in only CABG Group. Post-operative ICU mortality rate was 1.68% in Group -1, and 1.8% in Group -2. There were no intra-operative mortalities in this study.

A mean of 1.5±0.5 units of blood was transfused postoperatively in CE with CABG group, which is more than only CABG group, where 1.2±0.5 unitsof blood was transfused. In only CABG group, 91% patients were in regular follow-up, whereas 92.7% patients were in regular follow-up in CE with CABG group. At median follow-up of 2.5 years, 91.78% and 88.5% of patients were angina free in Only CABG group and CE with CABG group respectively. The rest of the postoperative characteristics including mortality and morbidity are listed in Table- 3. Only 1.2% patient of CE with CABG group presented with chest pain and was readmitted and, despite the fact that there was no electrocardiographic confirmation of acute myocardial ischemia, a cardiac catheterization was done which showed

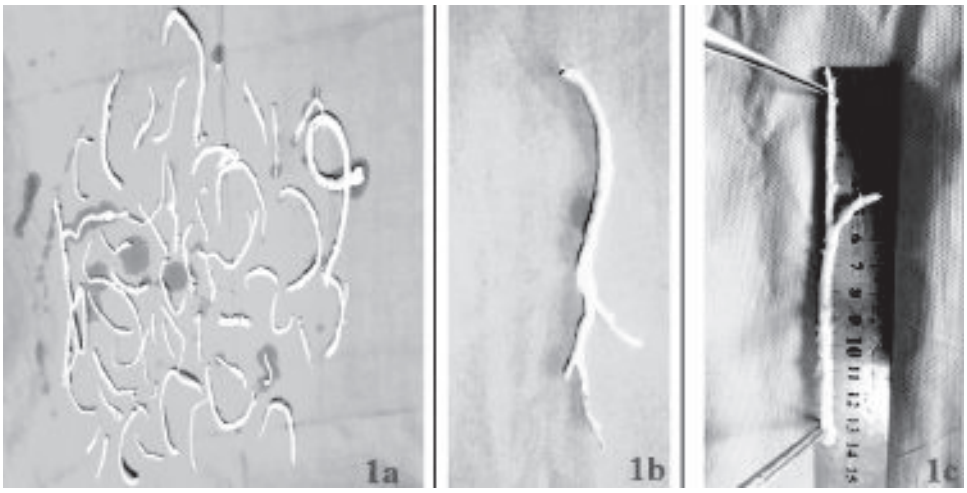

Fig.-1: *Photograph illustrate coronary atheroma. (a) Bunch of Coronary atheroma; (b) Tapper end of atheroma indicates complete endarterectomy; (c) Longest atheroma (14 cm) extracted from RCA.*

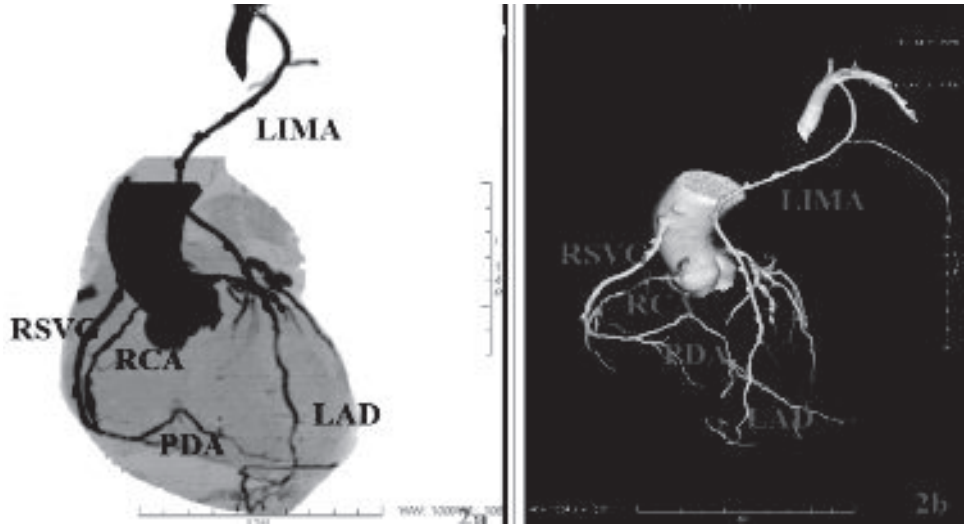

Fig.-2: *Postoperative CT Angiogram following CE with CABG(a) and (b); Patent distal anastomosis graft-LIMA to LAD; RSVG to PDA graft; (A 14cm long atheroma was extracted from RCA of this patient).*

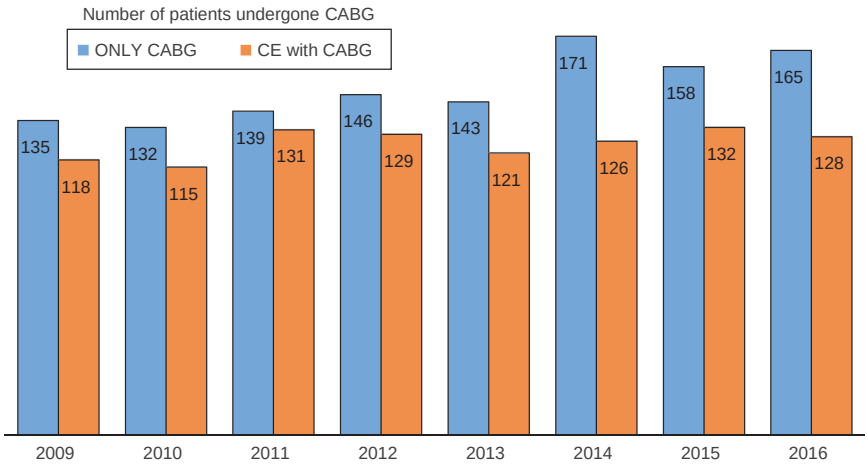

Fig.-3: *Bar diagram showing number of patients undergone CABG surgery at different years.*

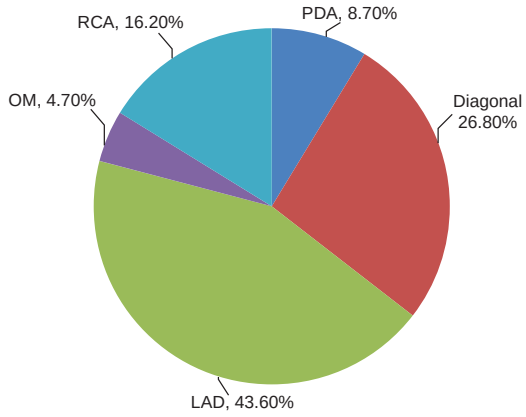

Fig.-4: *Pie chart represents territory of endarterectomies in percentage.*

Table-I

Pre-operative characteristics of study population.

Variable		Only CABGn=1189	CE with CABGn =1000
Age in years		59.75±2.5	62.5±3.5
Sex	Male	892 (75.02%)	780 (78%)
	Female	297 (24.98%)	220 (22%)
Risk factors	Hypertension	967 (81.33%)	820 (82%)
	Dyslipidemia	938 (78.89%)	768 (76.8%)
	Smoking	875 (73.59%)	720 (72%)
	Diabetes mellitus	405 (34.06%)	350 (35%)
	Family history	675 (56.77%)	550 (55%)
Previous MI	875 (73.59%)	720 (72%)	
Angioplasty	158 (13.29%)	150 (15%)	
LVEF	EF >50%	765 (64.34%)	550 (55%)
	EF 30-50%	347 (29.18%)	322 (32.2%)
	EF <30%	77 (6.48%)	128 (12.5%)
NYHA functional class	1 - 2	405 (34.06%)	325 (32.5%)
	3 - 4	784 (65.94%)	675 (67.5%)
CCS Class	1 - 2	431 (36.25%)	333 (33.3%)
	3 - 4	758 (63.75%)	667 (66.7%)
EuroSCORE	5.6±1.2	5.8±1.6	

Table-II
Per-operative data of study population

Variable	Only CABG; n=1189	CE with CABG; n=1000	
Number of graft	X_2	212	110
	X_3	773	540
	X_4	172	310
	X_5	32	40
Internal mammary artery (IMA) use	LIMA	1175 (98.82%)	1000 (100%)
	RIMA	387 (32.55%)	430 (43%)
CPB	On Pump	33 (2.78%)	185 (18.5%)
	Off Pump	1156 (97.22%)	815 (81.5%)
LM Disease	128 (10.77%)	115 (11.5%)	
Operative criteria	Emergency	28 (2.36%)	11 (1.1%)
	Urgent	196(16.48%)	184 (18.4%)
	Elective	965 (81.16%)	805 (80.5%)
Number of Endarterectomy in CE with CABG group; N=1200			
Territory of Endarterectomy	LAD	43.60% (436)	
	OM	4.7% (47)	
	Diagonal	26.8% (268)	
	RCA	16.2 (162)	
	PDA	8.7% (87)	

Table-III
Post-operative variables of study population

Variables	Only CABG n=1189	CE with CABG n=1000
Ventilation time (hours)	9.2±1.8	9.5±2.5
ICU stay (hours)	36.2±5.1	36.5±7.1
ICU mortality	20 (1.68%)	18 (1.8%)
Hospital stay (days)	10±1	10±2
Late mortality (>6 months)	3 (0.25%)	9 (0.9%)
New onset AF	125 (10.51%)	150 (15%)
Post-operative Acute MI	17 (1.43%)	33 (3.3%)
Renal failure	26 (2.19%)	25 (2.5%)
Respiratory failure	14 (1.18%)	12 (1.2%)
Neurological complications	9 (0.76%)	15 (1.5%)
Use of IABP(Intra-aortic balloon pump)	6 (0.51%)	8 (0.8%)
Post-operative blood transfusion (units)	1.25±0.5	1.5±0.5
Back to theater	5 (0.42%)	8 (0.8%)

impediment of a little left marginal branch. The major postoperative morbidity and mortality were compared between two group. There was no significant difference in term of postoperative outcome like MI, renal failure, respiratory failure, neurological complication and use of Post-operative IABP.

Discussion:

The study evaluated outcomes of CABG with or without CE (coronary endarterectomy) and shown that the complete revascularization of coronary artery disease enhanced the early and late post-operative outcomes following CABG. The mean age of study population was 59.75±2.5 and 62.5±3.5

in only CABG group and CE with CABG group respectively. In this review, 16.5% of the patients required multiple endarterectomies in CE with CABG group (1.2 endarterectomies per patient). The mean graft number were 3.02±0.15 and 3.28±0.25 in only CABG group and CE with CABG group respectively. There were 18.5% conversions to on-pump CABG using cardiopulmonary bypass in CE with CABG Group andPost-operative ICU mortality rate was 1.68% in Group -1, and 1.8% in Group -2. There were no intra-operative mortalities in this study. The mean follow-up period was 8.5±3.5 months (between of 6 to 24 months). In our study, moreblood was transfused postoperatively in CE with CABG group rather than only CABG group. At median follow-up of 2.5 years, 91.78% and 88.5% of patients were angina free in Only CABG group and CE with CABG group respectively.

In spite of the presentation of coronary endarterectomy (CE) 40 years prior[1] as a strategy for treatment of diffuse coronary artery disease, its application remains controversial as it conveys a higher perioperative hazard and poor long-term survival.Coronary endarterectomy is performed through a little incision usually 8-10mm arteriotomy, and simpler to reconstruction. Usually we utilize the "Traction technique-slow, sustain and continuous traction" to perform endarterectomy[2]. The potential dangers are inadequate expulsion of the plaque and the "snowplow effect," to be specific, shearing-off of the plaque in the side branches[2]. But with the "open procedure" the vision is better, and that may prompt more entire expulsion of the atheroma from the coronary vessel and its side branches. However, open technique is time consuming and required patch repair. So that, we preferred "traction technique" with careful examination of the atheromatous plaque after expulsion, which also supported by other article[2,16]. Myocardial contraction in the LAD territory is more vigorous than the RCA region. This helps in the extraction of the distal atheromatous plaque by traction technique easily from LAD artery as compared to the RCA[2,16,21]. We also observed that it is easier to remove atheroma from LAD than RCA, which is also described in another article. In a study, Ranjan et al. described about a 14cm long coronary atheroma extracted from right coronary artery during off-pump CABG and postoperative CT angiogram reveals patent RSVG to PDA graft[2].

There are very few published articles describingcombined CEwith OPCABG surgery. Now-a-days off-pump CABG surgery for multi vessel myocardial revascularization in high risk patients has been appeared to decrease the frequency of perioperative morbidity and mortalityand the duration of hospital stay[7,9]. In a study, Smith et al. observed that majority of patients are belongs to 61 to 70-year age group, which is similar to our study[8].Islamoglu et al. shows that total myocardial revascularization improves LV function postoperatively[10].The low occurrence of readmission to the intensive care unit (ICU), come back to theater for bleeding or cardiac tamponade, infection, and stroke in these high-risk patients in our OPCABG series with concurrent CE contrasts positively with published OPCABG articles[11]. Inadequate myocardial revascularization has been appeared to be a standout amongst the most critical components that influences perioperative outcome, ventricular function, early and late mortality[12,13]. Complete revascularization of the LAD is considered as a crucial determinant of the post-operative patient's recovery[12,13]. Despite the fact that, in our review the commonest site of CE was the LCA territory (75.1%), and LAD endarterectomy was required to be performed in 43.6% of these patients. Curiously, RCA territory (RCA and PDA) endarterectomy was performed in just 24.9% of the entirestudy population. But majority of the patients have triple vessel disease, which is not similar to other findings[8,12,13].The endarterectomy procedure is as yet a matter of controversy[14,15].

Following coronary endarterectomy, routine Heparin infusion was prescribed to prevent thrombosis in graft or native tissue in the early post-operative period followed by oral Warfarin for next 6 months, which is also supported by other articles[2,3,13,14]. Our protocol is that, once postoperative blood draining is settle down (usually 3-4 hours following surgery), we started Heparin usually for 48 hours, followed by bridging to Warfarin (5mg) orally from 1stpost-operative day. From 3rd Post-operative day, we prescribed Warfarin (2.5mg) for next 6 months and dose adjusted according to INR findings (our targeted is INR 1.5-2.5).We also prescribed Clopidogrel and Aspirin (75mg) for life long following CE with OPCABG, which also described in other articles[2,3,13,14].In our review, only 0.76% and 1.5% patientshad transient ischemic attack (TIA) in only CABG group and CE with CABG group respectively with complete recovery, which agrees in the review of Naseri et al. who revealed no neurologic deficit[18]. In a study, Djalilian et al. shows only 9% of their patients got angina at 46±19 months follow up, though Gill et al. observed intermittent angina in 15% of their patients at a mean follow-up of 36±16 months[14,16]. However, the rate of repetitive angina in our study was 11.3% that is equivalent to that announced by different authors after CE with OPCABG. Vohra et al. observed 10% recurrence of angina following OPCABG with coronary endarterectomy which is similar to our study[21]. However, Christakis et al. observed 35% recurrence rate of angina at 5 years follow up in their study, which is significantly higher than our study[22]. This distinction in recurrence of side effects might be because of the

especially extreme nature of the coronary disease or to inadequate revascularization accomplished. One of the confinements of our review is the absence of follow-up angiographic evaluation. However, it is encouraging that 88.7% of our study population were free from angina at long term follow up, which is also supported by others study finding[21].Naseri et al. revealed a higher postoperative MI rate of 6.8% after OPCABG with CE in completely blocked or more than >50% stenosis[18]. However, multiple published literature shows that acute myocardial infarction (MI) due to acute graft occlusion is a noteworthy complication following CE with an incidence rate of 1.5% to19%[14,19]. The occurrence of post-operative MI in our study was 1.43% in only CABG group and 3.3% in CE with CABG group. But in another study, Vohra et al. observed that postoperative MI rate following OPCABG with coronary endarterectomy is 4.3%, which is similar to our study[21].

In our study, the mortality in the both group was associated with aging process, specially age more than 70 years, emergency or urgent CABG surgery, preoperative renal function impairment, multiple comorbidities like diabetes mellitus, peripheral vascular disease, and LV dysfunction. We observed, early mortality is accounted to be higher after LAD endarterectomy and in patients experiencing endarterectomy of more than one coronary artery, which is supported by other authors[7,15]. In a study following CE with OPCABG, Erylimaz et al. shows no mortality at one-year follow-up[19].Naseri et al. who compared both on pump and off pump CABG with CE, described a mortality of 2.2% in a series of 44 patients[18]. The number of multiple endarterectomies in our review was 16.5%, which is higher in compared to other study[21].Though Vohra et al. observed1-year survival rate is 91.5%, and 5-year survival rate is 87.9% are amazing as compared to others study result[21]. Many authors describe the incidence of early mortality after CE with OPCABG is 2-15%[20,22]. But interestingly with regards to CE with OPCABG, Careaga et al. revealed a 30-day mortality of 0% in their small series study[23].We observed in this study that, endarterectomy of the circumflex artery is unnecessary when vessel is small, in presence of diffuse disease and severe calcification of vessel. Vohra et al. also recommended same as like as our findings following their study[21].

Beretta et al. observed in their study that, the utilization of the IMA for reproduction of the LAD graft prompts early patency, decreased perioperative myocardial dead tissue, and enhanced 5-year survival rate[17]. However, Mannacio et al. also observed similar findings in their study[24]. Despite the advancement of medical science, the morbidity and mortality following CE with CABG is more prominent than with CABG alone[26]. However, the consequences of the present review are not concordance with these discoveries[25] as in the both study group patients had a lower mortality in our review.In our review, at 1-year survival rate was 98.07% in only CABG group and 97.3% in CE with CABG group and also 90.08% and 88.7% survival rate at 5 years follow up respectively.Djalilian and Shumway reported higher incidence of mortality in patients who had preoperative myocardial infarction[14,26]. In our review, there was a higher incidence of preoperative MI in patients who required CABG (73.59% in only CABG group and 72% in CE with CABG group), however, CE was not found to be independently associated with mortality in the analysis for the predictors of mortality.Moreover, this mortality was not an aftereffect of the CE, which is also stated by different authors[6,16]**.** In a study, Brenowitz et al. also reported that multiple endarterectomize are more common in a patients of age over 70 years, diabetes mellitus, female sex, reoperation, and also having severe LV dysfunction[25]. Atik et al. observed in a study that female sex, previous MI, left main disease, diabetes mellitus, and a low ejection fraction (<35%) to be related with higher incidence of early mortality[26].

Conclusion:

In diffuse coronary artery disease, CE (Coronary endarterectomy) with off-pump coronary artery bypass graft is attainable and accomplishes total myocardial revascularization; when there are no other alternative options for sufficient revascularization.Surgical skill and the patient's selection criteria are main stream for better outcome in CE with CABG surgery, despite the higher risk group, severe LV dysfunction, and diffuse coronary lesion.

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Disclosure of interests:

No potential conflict of interest with respect to the research, authorship, and/or publication of this article.

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Original Article

Cardiac Myxoma- 17 Years Experience in a Tertiary Care Centre of Bangladesh

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Abstract:

Cardiac Myxoma is the most common benign intracardiac tumor of heart. We studied its incidence, clinical presentations, short term outcome, morbidity and mortality following surgery over a period of 17 years. The study was performed inthe department of cardiac surgery, National institute of Cadiovascular diseases (NICVD) Dhaka, over a period from 2000to 2016. NICVD is the tertiary hospital for cardiovascular surgery in the Government sector. Over this period of 17 years 11,923 open heart surgery was done of which 129 were cardiac myxoma patients. As a result, cardiac myxoma patients constituted 1.08%of all open heart surgery. Preoperative diagnosis was done on clinical presentations and 2D echocardiography, which is the most important tool for its diagnosis. Most of the patients presented at 4th to 5th decade of life. The patients presented with triad ofvalve obstructive features, embolic symptoms andconstitutional symptoms alone or in combination. Among all myxoma patients, majority(86.6%) had left atrial myxoma. Cardiac myxoma forms a very small percentage of all cardiac diseases requiring surgical treatment. Immediate surgical excision is indicated in all patients to avoid life-threatening complications. Outcome of surgical treatment was excellent.

Key word: Cardiac, Myxoma, Surgery, Bangladesh.

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Introduction:

Cardiac myxoma is the most common benign tumour of heart and commonly diagnosed by echocardiography. Incidence of cardiac tumors ranged from 0.0017% to 0.33%(3). Of all cardiac tumors 75% are benign; 50% of the benign tumors are myxomas[3].Grossly myxomas are rounded, oval or polypoid soft gelatinous friable mass having smooth or lobulated surface. Its size may vary from 0.5 to 15 cm in diameter and is of white, brown or yellowish in colour. Most are pedunculated and some are sessile.Almost all arise from the region of fossa ovalis of interatrial septum and a few from other part of the endothelial surface of the heart[3].

About 75% myxomas occur in left atrium and 20% in right atrium and less than 10% in ventricles(4). Myxomas can occur at all ages (about 15% in 1-15 yrs age group) but its incidence is greatest in 3rd to 6th decade. This tumor is of great interest because of its low incidence, protean clinical manifestations, potentially curable form of serious cardiac disease and ease of its diagnosis (only by echocardiography).

NICVD is the parent cardiac institute of Bangladesh and performing all types of cardiac surgery including cardiac

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tumors except Heart transplantation. In NICVD open heart surgery has been started in 1981; since then cardiac myxomas have been resected, along with other cardiac surgery. Initially the surgical incidence of cardiac myxoma was low due to lack of awareness of our population and low socioeconomic conditions and also due to lack of diagnostic facilities in the peripheral hospitals. For the last 17 years the incidence of cardiac myxoma patients in the department of cardiac surgery has increased, may be due to improvement of economic solvency and awareness of people, increasing diagnostic facilities all over the country and good surgical outcome.

But there is no documentation or study in the department of cardiac surgery regarding the incidence and status of surgical treatment of cardiac myxoma in NICVD which represent the mother institute of cardiovascular diseases of Bangladesh. So we felt keen interest to perform a study regarding the incidence, age of occurrence, clinicalpresentations, male female ratio of the patients with the disease and status of myxoma surgery at NICVD, Dhaka.This will enable us to compare these parameters with those of other countries and also increase the awareness regarding this serious disease of our medical professionals as well as common people of Bangladesh.

Materials and Methods:

This study was conducted in the department of cardiac surgery, NICVD, Dhaka, Bangladesh. The period of study was from January 2000 to December 2016. A retrospective observational study was performed. In this study all patients admitted with the diagnosis of cardiac myxoma and underwent surgical excision of the tumour were included. We studied the incidence, male female ratio, age of presentation, clinical presentations, peroperative findings of tumors(location, attachments and size), perioperative and post operative complications and early (in-hospital and one month following discharge) outcome of surgical treatments.

Diagnosis of myxoma was established by 2D Echocardiography. No patient required TEE or other imaging technique. Operation was undertaken on emergency basis soon after diagnosis to avoid complications (sudden death, stroke, acute limb ischaemia etc). The standard surgical approach was through a median sternotomy; cardiopulmonary bypass (CBP) was stablished with aortic and bicavalcanulation. Myocardial protection was achieved with antegrade cold blood cardioplegia and moderate hypothermia. The surgical approach to left atrial myxoma was through right atrial and transeptal. The tumor was resected completely along with a button of full thickness intratrial septum where the tumor was attached. All four chambers were explored to exclude multicentric origin of tumor and to remove any fragment of tumor by thorough irrigation. Defect created in the interatrial septum was repaired directly with prolene suture or using a pericardial patch. The size of the tumor was measured and recorded and all the tumors were sent for histopathological examinations. During the post-operative period the patients were treated in ICU and then in the wards. All patients came for follow up one month after discharge.They underwent clinical examinations and investigations for blood for CBC, chest X-ray and echocardiogram during the first follow up.

Results:

129 patients underwent operation for cardiac myxoma during this 17 years period (January 2000 to December 2016) in this institution.

Table- I

Age and sex distribution ofpatients(n=129)

Age group	Number of patients	Male	Female
20-30	5 (04%)	3	2
31-40	49(38%)	17	32
41-50	56(43%)	21	35
51-60	19(15%)	4	15
Total		45 (35%)	84(65%)

45 patients (35%) were male and 84 patients (65%) were female. Male female ratio was 1:1.9. only 5(04%) patients were in 20 to 30 years age group and 19(15%) were in 51 to 60 years of age group. 105 patients (81%) were distributed into 31 to 50 years of age group. That is, most of the patients were distributed into 4^{th} to 5^{th} decade of life.

Table-II

Clinical presentations of patients (n=129)

Symptoms	Number of patients	Percentage
A. Obstructive symptoms		
(Symptoms of valve obstructions)	17	13%
B. Embolic symptom	6	4.6%
a. Stroke	5	03.8%
b.Acute limb ischaemia	1	0.8%
C. Constitutional symptoms	5	3.8%
D. Mixed	101	78.3%
a.Constitutional plus embolic	02	1.6%
b.Constitutional plus obstruction	99	76.7%

17 patients (13%) presented with intermittent mitral/tricuspid valve obstructive symptoms. 6(4.5%) patients presented with embolic features; of these, 5 patients (03.8%) presented with stroke and 1 patient(0.8%) presented with amputation

due to acute right lower limb ischaemia.5 patients (6%) presented with only constitutional symptoms. 101 patients (78%) presented with mixed symptoms . Of these, 99 patients (76.7% of all) presented with both obstructive and constitutional symptoms and, 2 patients(1.6%) had features of both stroke and constitutional symptoms.

Table-III

Distribution of Myxomas in cardiac chambers.(n=129)

Name of Cardiac chambers	Number of patients	Percentages
Right atrium	14	11%
Left atrium	112	86.6%
Multicentric(Biatrial)	02	1.6%
Right Ventricle	01	0.8%
Left ventricle	00	00%
Total	129	100%

112 patients(86.6%) had left atrial myxoma and only 14 patients(11%) had right atrial myxoma. 2 patients had multicentric (biatrial) myxoma and 1(one) patient had myxoma originated in the right ventricle.124 myxomas were attached to the interatrial septum in the region of Fossa ovalis and only 5 ones were attached in the other parts of the endothelial surface of the atria. Among all,114myxomaswere pedunculated and 15 were sessile. The size of the myxomas ranged from 3 cm to 12 cm in maximum diameter.

Table IV

Postoperative complications and mortality(n=129)

Name of Complication	Number (%)
Superficial sternal wound infection	5 (3.88%)
Pleural effusion	3 (2.33%)
Supraventricular arrhythmia	3 (2.33%)
Reexploration for bleeding	2 (1.55%)
Prolonged Ventilations	4 (3.10%)
Death	3 (2.33%)

Peroperative embolization did not occur in any patient. 17patients developed postoperative complications which were managed accordingly and then all were discharged in sound condition. Three patients died in ICU, one due to low output syndrome(LOS) and two due to respiratory failure,predispose by severe poor general condition.

Discussion:

Cardiac myxoma constituted 1.08% of the total open heart surgery during this period of 17 years(January 2000 to December 2016). This figure is about thrice the reported results in the literature (approx 0.3%)[5]. In our study incidence in the female sex is higher similar to the reports in many other studies[6-7]. Our patients confirmed age distribution as evident in other series[8].

In most series ratio of the tumor occurrence in the left and right atria is nearly 7:2.But in our study it is 8:1 that is, more than 2 times greater. Size range of myxoma is similar to most other studies. Myxoma patients presented with one or more of the triad of intracardiac obstruction, embolism and constitutional symptoms. In our study most patients 99(76.7%) presented with combination of constitutional and intracardiac obstructivesymptoms[9-4]. A higher frequency of embolization (30-40%) was reported in western series but in our study it is merely8(6%).

Like most centers we approached LA myxoma through right atrial and transseptal route. This allowed good exposure and viewing all four cardiac chambers. Only one surgeon used Left atriotomy to excise LA myxoma. During excision of RA myxoma we applied another cross clamp across MPA to prevent peroperative pulmonary embolism.

We could not maintain prolong follow up to monitor recurrence of tumor. We studied only early outcome (upto one month following discharge: first follow up). But no surgeon reported any patient presented with recurrence of the disease locally or at remote organ. Post operative complications were almost similar to other series[5-10].

Conclusions:

Cardiac myxomas form a very small percentage of cardiac diseases. Most myxomas in our population arise in LA. Immediate surgical treatment is indicated in all patients to prevent sudden death and embolic complications. This tumor can be excised with low rate of morbidity and mortality. Early outcome of myxomas surgery in our centre is excellent and is of international standard.

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Original Article

Association of Serum Ferritin Level with Acute Coronary Syndrome

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Abstract:

Background: A substantial number of patients get admitted in different hospitals of Bangladesh with the diagnosis of acute coronary syndrome (ACS). No underlying conventional risk factors can be identified in significant number of these patients. Therefore new emerging risk factors are likely to be involved in these patients. As many authors reported that high serum ferritin levels are associated with diabetes mellitus (DM) and hypertension (HTN), it may have role in the pathogenesis of ACS.So we designed this study to test the relation between hyperferritinemia and newly diagnosed acute coronary syndrome patients of Bangladesh.

Methods: The study was an observational case control study done in Department of Cardiology, Dhaka Medical College Hospital, from January 2013 to December 2013. Newly diagnosed patients with acute coronary syndrome (ACS) in the age group of 30- 70 years, admitted in the coronary care unit (CCU) of Dhaka Medical College Hospital, Dhaka, within the study period were taken as cases and age& sex matched healthy subject with no history of ischemic heart disease (IHD) and with normal ECG were taken as control by purposive sampling. In our study, the number of cases and controls were 65 each. So, total number of subject was 130.

Results: According to the serum ferritin level both cases and controls were divided into two sub groups: subjects with normal ferritin level and with hyperferritinaemia. Normal ferritin level was found in 35(53.8%) subjects of case group and 62(95.4%) subjects of control groups. Hyperferritinaemia was found in 30(46.2%) subjects of case group and 3(4.6%) subjects of control group. Hyperferritinaemia was found to be significantly higher in case group than in control group (p<0.001).

Conclusion: The study concludes that the serum ferritin level of patients with ACS was significantly higher than the control group

Key wards: *Acute coronary syndrome, Risk Factor, Ferritin.*

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Introduction:

Coronary artery disease (CAD) has become a major health problem and is one of the most common causes of mortality & morbidity in the entire world [1]. Among the coronary artery diseases, acute coronary syndrome (ST segment elevation

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myocardial infarction, non-ST segment elevation myocardial infarction and unstable angina) is the leading cause of death in the developed countries & second leading cause of death in developing countries .By the year 2020, ischemic heart disease (IHD) will hold first place in the WHO's list of leading causes of disability[2].Acute coronary syndrome a multifactorial disease, involves well-known risk factors such as age, male sex, smoking, hypertension, diabetes mellitus, dyslipidemia, obesity, family history of premature CAD & sedentary lifestyle.

There are several studies from developed countries on analysis of major risk factors of ACS; such studies are quite scanty in Bangladesh[3]. The conventional risk factors such as smoking, hypertension, diabetes mellitus, hypercholesterolemia & positive family history can no longer be said to account for all atherosclerotic CADs now-a-days. Eikelboom et al (1999)suggested that only one half to two-thirds of risk for atherosclerotic vascular disease can be explained by classic risk factors[4]. Evaluation of major coronary risk factors in Indian patients undergoing angiography has shown that in about one-third of the patients no major risk factors are detectable, yet they suffer from the dreaded disease; therefore, the identification of newer risk factors is under active consideration [5] Ferritin is an intracellular protein that stores iron and releaseitin controlled fashion. It reflectsthe amount of iron stored. Free iron acts as a catalyst for the production of free radicals which has been implicated in lipid peroxidation and atherosclerosis leading to acute coronary syndrome[6].The role of ferritin in pathogenesis of coronary artery disease (CAD) like acute coronary syndrome (ACS) has generated considerable interest in recent times. High serum ferritin levels have been found to be associated with established conventional risk factors of CAD like diabetes mellitus (DM) and hypertension (HTN) by various authors[7]. There is a plethora of articles reporting the relationship between serum ferritin and ACS but with conflicting results. Sullivan (1981) was the first to observe that high level of stored iron is a risk factor for ischemic heart disease[8]. Subsequently results of various studies showed statistically significant association of high serum ferritin with acute coronary syndrome[9]. After extensive literature search we found no published article testing the relationship of high serum ferritin level with acute coronary syndrome in Bangladeshi population.

Methods:

This observational case control study was conducted in the Department of Cardiology of Dhaka Medical College Hospital during a period of one year from January 2013 to December2013.Patients with suspected ACS admitted through emergency or outpatient department into CCU, department of Cardiology of Dhaka Medical College Hospital, were first assessed by the attending doctor and then evaluated by the principal investigator.12 lead standard surface ECG and cardiac biomarker (Troponin-I) were done. Detailed history was taken and physical examination was done and required data were recorded in preformed data collection sheet. Newly diagnosed patients with acute coronary syndrome (ACS) in the age group of 30- 70 years were taken as **cases** and age & sex matched healthy subjects (doctors, medical students, nurses & other hospital-staffs and patient's attendants from DMCH, Dhaka) within the study period with no history of ischemic heart disease (IHD) and with normal ECG were taken as **control** by purposive sampling .In this study, the number of cases and number of control were 65 each. So, total number of subject was 130. Informed consent was taken from the study subject or from the legal guardians before enrolling them in the study. All the study subjects were evaluated for demographic profile (age & sex) and risk factors for coronary artery disease like diabetes, hypertension, dyslipidemia, smoking, overweight/obesity, and family history of premature coronary artery disease (CAD) were recorded. Baseline investigations e.g. ECG was done and fasting lipid profile, fasting blood sugar and serum ferritin were estimated for all cases and controls. Serum ferritin was done by using XYEM enzyme-linked immunosorbent assay (ELISA) test using ELISA reader. Comparison of serum ferritin levels was done between cases and controls and the association of serum ferritin levels with ACS was studied.

All the information was properly noted in the preformed data collection sheet.Data were analyzed by using SPSS version 16. The continuous data were expressed as mean± standard deviation (SD). The difference of mean of continuous variables between two groups were calculated byStudents t test. To determine the independent association of serum ferritin with ACS, initially univariate analysis was done followed by multivariate logistic regression analysis, with ACS as a dichotomous independent outcome variable. The categorical variables (discrete data) were expressed as frequency and percentage. The difference of categorical variables between two groups were calculated by chi-square ($Ç^2$) test. Level of significance was set at 0.05. Risk analysis were carried out by calculating odds ratio (OR) and 95% confidence interval (CI).

Results:

This observational case-control study enrolled 65 newly diagnosed patients with acute coronary syndrome (ACS) in the age group of 30-70 years, admitted in the coronary care unit (CCU) of Dhaka Medical College Hospital, Dhaka within the study period. They were designated as case group. Age

and sex matched 65 healthy subjects (doctors, medical students, nurses and other hospital-staffs and patient's attendants) with no history of ischemic heart disease (IHD) and normal ECG were taken as control. The comparison between mean of serum ferritin between two groups was done by Student t test and comparison of proportions of serum ferritin between two groups was done by chi-square test. P value <0.05 was considered significant.

Among the subjects of case group, maximum number of subjects belongs to the age group of 50-59 years (38.5%) followed by age group of 60-69 years (29.2%). Among the subjects of control group, maximum number of subjects belongs to the age group of 40-49 years and 50-59 years (29.2% in each) followed by age group of 60-69 years (27.7%). In cases the mean age was 52.65±9.44 years and in controls the mean age was 50.94±10.38 years. The difference of mean ages between the case and control groups was not statistically significant. (p=0.328)(Table-I).

Among cases 44(67.7%) were male and 21(32.3%) were female, among the controls 44(67.7%) were male and 21(32.3%) were female. The difference in sex between groups was not statistically significant (p=0.463) (Table-II).

According to serum ferritin level both cases and controls were divided into two sub groups: subjects with normal ferritin level (d"300 µg/L in male, d" 200 µg/L in female)and with hyperferritinaemia (>300 µg/L in male, > 200 µg/L in female).Normal ferritin level was found in 35(53.8%) subjects of case group and 62(95.4%) subjects of control groups. Hyperferritinaemia was found in 30(46.2%) subjects of case group and 3(4.6%) subjects of control group. Hyperferritinaemia was found to be significantly higher in case group than in control group (p<0.001).

The mean±SD serum ferritin level was also higher in case group then controls group (225.15±164.05 µg/L in case group and 83.97± 60.61µg/L in control group). (p<0.001) (Table III).

Hyperferritinaemia was found in 30(46.2%) subjects of case group and 3(4.6%) subjects of control group. Normal ferritin level was found in 35(53.8%) subjects of case group and 62(95.4%) subjects of control group. The difference was statistically significant (p<0.001). During risk assessment of ferritin concentration for ACS development, it was found that high serum ferritin was strongly associated with ACS risk having OR=7.031 (95% CI=2.366-20.896) (table IV)Risk factors analysis for ACS by multivariate logistic regression showssmoking, hypertension, diabetes, family history of premature CAD and hyperferritinaemia, were found to be significantly (p<0.05) associated with ACS-risk. However, dyslipidaemia and obesity/overweight were not found to be significantly associated with ACS risk (p>0.05). (Table V).

Table I

Age distribution of the study subjects (n=130)

Age in years	Case group (n=65)		Control group (n=65)		Total (n=130)		P value
	f	%	f	%	f	%	[b]0.163 NS
30-39	4	6.2	9	13.8	13	10.0	
40-49	14	21.5	19	29.2	33	25.4	
50-59	25	38.5	19	29.2	44	33.8	
60-69	19	29.2	18	27.7	37	28.5	
70 or more	3	4.6	0	0.0	3	2.3	
Mean±SD	52.65±9.44		50.94±10.38		51.79±9.92		[a]0.328NS
Range (min-max)	30-70		30-66		30-70		

NS= not significant
a=P value derived from unpaired t test; b=P value derived from chi-square test

Table-II

Sex distribution of study subjects (n=130)

Sex of the subjects	Case group (n=65)		Control group (n=65)		Total (n=130)		P value
	f	%	f	%	f	%	
	f	%	f	%	f	%	[b]1.000NS
Male	44	67.7	44	67.7	88	67.7	
Female	21	32.3	21	32.3	42	32.3	

NS= not significant
b=P value derived from Chi-square test

Table III

Distribution of the study subjects according to serum ferritin level (n= 130)

Serum ferritin level	Case group (n=65)		Control group (n=65)		Total (n=130)		P value
	f	%	f	%	f	%	a<0.001S
Normal ferritin level	35	53.8	62	95.4	97	74.6	
Hyper-ferritinaemia	30	46.2	3	4.6	33	25.4	
Mean±SD (µg/L)	225.15± 164.05		83.97± 60.61		154.56± 142.11		
Range (min-max)	(5.60-580.00)		(20.00-305.00)		(5.60-580.00)		b<0.001S

Normal ferritin level, ≤300 µg/L in male, ≤ 200 µg/L in female; Hyperferritinaemia, >300 µg/L in male, > 200 µg/L in females= Significant,
a= p value derived from chi square testb= p value derived from unpaired t test

Table-IV

Risk assessment of serum ferritin concentration for ACS (N==130)

Serum ferritin level (µg/L)	Case group (n=65)		Control group (n=65)		Odds Ratio (OR)	95% CI for OR	P value
	f	%	f	%			
Normal ferritin level	35	53.8	62	95.4	17.7	2.366-20.896	<0.001[S]
Hyperferritinaemia	30	46.2	3	4.6			

Normal ferritin level, ≤300 µg/L in male, ≤ 200 µg/L in female;
Hyperferritinaemia, >300 µg/L in male, > 200 µg/L in female,
S= Significant

Table-V

Risk factors analysis for ACS (multivariate logistic regression models) (N=130)

Risk factors	Regression coefficient	95% CI for Regression coefficient		P value
		Lower	Upper	
Smoker	2.28	2.991	32.124	<0.001[S]
Hypertension	2.945	3.473	104.034	0.001 [S]
Diabetes mellitus	1.792	1.465	24.590	.013 [S]
Family history of premature CAD	1.731	1.253	25.425	.024[S]
Dyslipidaemia	0.423	0.449	5.181	.498 [NS]
Obesity/ Overweight	.471	.414	6.207	.495 [NS]
S ferritin status	2.187	.025	.498	.004 [S]

Risk factors analysis for ACS by multivariate logistic regression showssmoking, hypertension, diabetes, family history of premature CAD and hyperferritinaemia, were found to be significantly (p<0.05) associated with ACS-risk. However, dyslipidaemia and obesity/overweight were not found to be significantly associated with ACS risk (p>0.05).

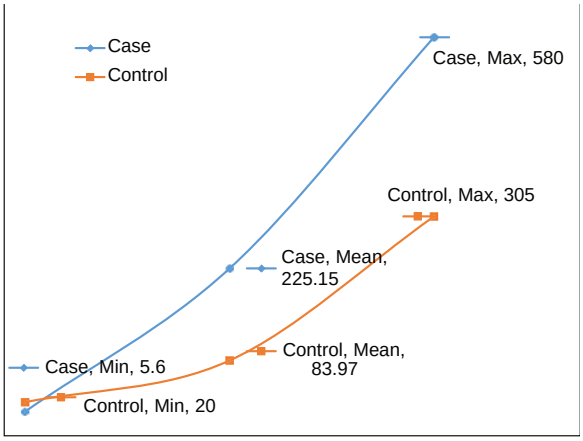

Fig.-1: *Line diagram showing mean, maximum and minimum distribution of serum ferritin level (µg/L) of the study subjects (N=130).*

Discussion:

This observational case-control study was carried out with an aim to find out the association between serum ferritin concentration and acute coronary syndrome (ACS). A total of 130 study subjects were studied. Among them 65 subjects had ACS (ST segment elevation myocardial infarction, Non-ST segment elevation myocardial infarction and Unstable angina) admitted in CCU, Department of Cardiology, DMCH, Dhaka and rest 65 were healthy subjects who were age and sex matched controls. Serum ferritin level and traditional risk factors for ACS were documented from all the study subjects.

In this study most of the ACS patients were between 40 to 69 years. However 10 % patients were below 40 years of age.The mean age of the case and control groups was similar (p=0.328).

Most of the patients were male 88 in number (67.7%) and number of female were 42 (32.3%) which is consistent with many other studies[10-16]. (p=1.000).

This study showed serum ferritin level was significantly higher in ACS patients (46.2% in case group vs. 4.6 % in control group) (p=< 0.001)

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Original Article

The Effects of Perioperative Intra-aortic Balloon Counter Pulsation on Left Ventricular Function in Patients Undergoing Coronary Revascularization Surgery

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Abstract:

Intraaortic balloon pump (IABP) is the most common mechanical assist device used for the treatment of low cardiac output in patients undergoing coronary artery bypass grafting (CABG). Despite recent advancement in cardiac surgery the overall mortality in patients receiving perioperative IABP remains high. In most cases the patient has poor Left ventricular (LV) function, diastolic dysfunction, recent myocardial infarction with septal rupture, heart failure and/or cardiogenic shock receiving an IABP counterpulsation support. Unfortunately patients with preserved LV function may also require IABP support to wean from cardio pulmonary bypass due to post-surgical myocardial dysfunction.

This hospital-based prospective observational study evaluated 60 patients, who underwent CABG, divided into two groups. Left ventricular ejection fraction was 56.93± 7.666 in Group A compared to 41.50± 6.735 in Group B. When compared with the corresponding preoperative ejection fraction both the group found to have improved ejection fraction among the survivors at three months. Left ventricular end diastolic diameter and end systolic diameter was also found improved in both the groups (53.15± 3.231mm vs 59.47± 4.200mm and 41.52± 2.847mm vs 44.47± 3.636mm respectively). No significant difference was observed in terms of 30days mortality and postoperative outcome.

Given its survival benefit, surgeons must use IABP in a pre-planned way. Here by we recommend that the use of risk prediction score for patient undergoing coronary revascularization surgery is useful.

Key Words: Aorta, Counter Pulsation, Coronary Artery Bypass Grafting.

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Introduction

Intraaortic balloon pump (IABP) is the most common mechanical assist device used for the treatment of low cardiac output in patients undergoing coronary artery bypass grafting (CABG). The counterpulsation theory was described by Harken in 1958 which lead to the first introduction of Intra-Aortic Balloon Pump (IABP) in 1968 by Kantrowiz group[1,2]. The use of balloon pumps increased substantially from 1968 to 1995[3-5], and IABP use increased progressively in patients who experienced difficult weaning from cardiopulmonary bypass (CPB)[6,7].

IABP successfully increase coronary artery blood ûow during diastole by inûating, and decrease the workload of the heart by deûating just before systole, thus reducing afterload[8]. LV volume and LV end-diastolic pressure (EDP) have been demonstrated to decrease in patients treated

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with IABP, whereas cardiac output, ejection fraction (EF), and coronary ûow may increase[9-11].

The LV performance is one of the most important predictor of CABG outcome. In most cases the patient with poor Left ventricular (LV) function is receiving an IABP counterpulsation support. Acute volume load applied during contraction or relaxation phase in heart muscle, increases or decreases the ejection phase duration, respectively. Moreover, altered loading conditions may result in dyssynchronous relaxation of the LV[12-13].

Myocardial relaxation is known to be sensitive to afterload and to LV-dyssynchrony in patients with dilated cardiomyopathy[14]. LV mechanical dyssynchrony in these patients decreased due to reduction in wall stress induced by interventions such as vasodilators, cardiomyoplasty, or LV ventricular reduction surgery. Hence IABP in patients with low EF may considerably inûuence cardiac performance by acute afterload changes and concomitant changes in LV mechanical dyssynchrony.

Unfortunately patients with preserved LV function may require IABP support for a number of factors e.g. advanced age, female sex, left main stenosis, redo operation, recent myocardial infarction and difficult to wean from cardio pulmonary bypass due to post-surgical myocardial dysfunction. However, overall mortality in patients receiving intraoperative or postoperative IABP remains high, ranging from 27% to 52%[15]. The survivors, irrespective of their preoperative LV performance are shown altogether to have a better outcome in postoperative periods in most of the studies.

Some prospective randomized and observational studies suggest that preoperative IABP insertion in high-risk patients undergoing CABG decreases mortality and morbidity, and shortens postoperative hospital length of stay[16,17]. But insertion practices vary, with the Benchmark Registry and Society of Thoracic Surgeons database and hence the role of the preoperative prophylactic IABP is subject to debate[18].

Thus the conflict persists in issue concerning the timing of IABP insertion and identification of appropriate candidacy for IABP. Although the outcome of IABP in patients with poor LV function is documented well, no comprehensive study showed the outcome for preserved LV function group. To the best of our knowledge, there has been no study done so far in Bangladesh regarding the IABP outcome in CABG patients. Therefore it seems logical to investigate. Accordingly, we sought to identify the outcome of patients receiving IABP support by concentrating upon LV performance.

Materials &Methods

This study was a hospital-based prospective observational study andwas conducted in the Department of Cardiac Surgery, National Heart Foundation Hospital and Research Institute, Dhaka, Bangladesh from July 2013 to June 2014 (1 year). Data collected from all patients who underwent elective or emergency Coronary artery bypass grafting (CABG) surgeryrequiring IABP support perioperatively. Patients were excluded from the study who has renal dysfunction (Creatinine>2.0 mg/dl), acute or chronic pulmonary disease,associated valvular heart disease, or associated congenital cardiac anomaly; requiring coronary end-arterectomy and/or Re-do coronary artery bypass grafting. Sample size was calculated using the mean difference of EDP (End diastolic pressure) to evaluate LV performance in patients with IABP with low ejection fraction, reported by Schreuder et al., 2005[19].

A prognostic risk stratiûcation model (Table-1) to predict the need for IABP insertion in patients undergoing CABG proposed by Antonio Miceliet al[20] in 2010 was used to evaluate its usefulness. All the patients are prospectively allocated into two groups. Group A: Constitute patients with preserved LV, Group B: Constitute patients with poor LV function.

A 5-MHz phased-array transesophageal transducer (GE: Healthcare Vivid-7 pro) was used for Transesophageal Echocadiography to measure left ventricle ejection fraction (EF) both prebypass and postbypass states. A trans-thoracic echocardiography was done on second post-operative day, during discharge, at all the followup of the patient with GE: Vivid 7-pro. Trans-thoracic echocardiography was done by Non-invasive Echocardiography consultants of NHFH&RI blinded towards the study.

Biochemical markers; Troponin-I and NT-proBNP analysis were done with Siemens Stratus CS Acute Care Diagnostic System; Flurometric analyser. A single data of each was documented and the highest value of these results was taken if repeated test were done. All the biochemical tests were done at the Department of Biochemistry at NHFH&RI.

Keeping compliance with Helsinki Declaration for Medical Research Involving Human Subjects 1964, all patients were informed verbally about the study design, the purpose of the study, and right of the participants to withdraw themselves from the project, at any time for any reason.Written consent was obtained from each subject in a pre-formed consent paper which was written in easily understandable local language.The study was approved by Ethical review committee of NHFH&RI and due clearance was obtained.The study was commenced following acceptance of the protocol by BCPS. Data were processed using

software SPSS (Statistical Package for Social Sciences) version 16.0 and for all analytical tests, the level of significance was set at 0.05 and $p < 0.05$ was considered significant.

Results

The present study performed in NHFH&RI, Dhaka, included 60 patients divided into 2 groups. The age ranged from 35 years to 67 years, but mean ages of the Group A and Group B was 53.21±6.66 and 52.97±7.77 respectively. Although a male preponderance was observed in both groups, the difference between the groups with respect to sex was not evident (Fig-1). Both the groups were identical in respect of height, weight, BMI and BSA. Distribution of overweight and obese patients was almost equal in both groups.

Figure 1 shows the sex distribution of the patients. Out of 60 patients, male was predominant 60.7% in Group A, 71.9% in Group B. The two groups' difference was not statistically significant by Fisher's Exact Test (p=0.261).

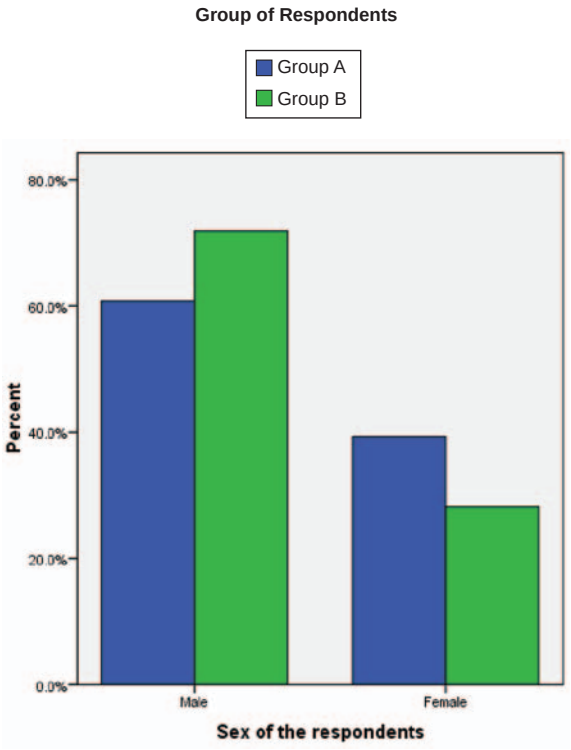

Fig.-1: *Sex distribution of the study patients*

The risk factors for ischemic heart disease like Diabetes was sub-classed in to Non diabetic, Diet control diabetes, Oral pills and insulin controlled diabetes. The difference between two groups was not statistically significant. Other cardiac risk factors included Hypertension, Hyperlipidemia and Smoking habit etc is delineated in Table-2. Other clinical characteristics which has potential influence in the outcome of coronary artery bypass surgery were also evaluted.

Table-I
IABP Risk Score Calculator

Variable	Risk Score
Age >70 years	2
CCS 3–4 class	2
Previous cardiac surgery	3
Moderate EF >40%	2
Poor EF <40%	7
Interval Between MI and Surgery (<30 days)	2
Left main stem disease (>50%)	2
Emergency surgery	3

CCS = Canadian Cardiovascular Society; EF = ejection fraction; MI = myocardial infarction. High-risk (score >14), Medium-risk (score 7 to 13), and Low-risk group (score <6) proposed by Miceli et al [20]

The extent of coronary artery disease was similar in both the groups and most of the patients were having triple vessel disease. A large number of patients in both the groups had Left main coronary artery disease 57.1% and 40.6% respectively. In regards to Echocardiography findings; there was no significant difference in both groups in terms of LVEF and left ventricular end diastolic diameter.However, Group A and Group B showed left ventricular end systolic diameter 39.25±3.329 vs 45.53±5.061 which was statistically significant (p=0.013). Regional wall motion abnormality was also found statistically significant in between Group A and Group B; these are expected in patients with low ejection fraction.

Operative urgency is an important predictor of coronary revascularization surgery. In our study we found emergency surgery was 25% in Group A and 18.8% in Group B; Urgent surgery was 39.3% and 40.6% respectively and rest were elective cases. The distribution was statistically not significant in all cases. All patients were assessed by using Euroscore-II and Logistic Euroscore, no statistical difference was found.

Intra-aortic balloon pump is used in peri-operative period as per hospital protocol and by using IABP-score. We evaluated the insertion of IABP in pre, per and post-operative periods. 46.4% patients received IABP in Group A in preoprative period than that of 50% of the patients of Group B. In all peri-operative period the use of IABP in both the groups were statistically non significant.

The post-operative out come between the groups was equivocal (Table-3). Other post operative complication

Table-II

Risk factors comparison of the study

Risk factors	Group-A (n=28)	Group-B (n=32)	P value
[a] No DM	8 (28.6)	13(40.6)	0.740^{NS}
[b]Diet Control	3 (10.7)	2(6.2)	
[b] Oral	10(35.7)	11(34.4)	
[b]Insulin	*7(25)*	*6(18.8)*	
[a] HTN	25 (89.3)	29 (90.6)	0.863^{NS}
[a] HDL	22 (78.6)	25 (78.1)	0.967^{NS}
[a]Non Smoker	16 (57.1)	18(56.2)	0.838^{NS}
[b] Current smoker	*3 (10.7)*	*5 (15.6)*	
[b] Ex-smoker	*9(32.1)*	*9 (28.1)*	
*[a]*Angina Status	22 (78.7)	26 (81.3)	0.495^{NS}
[b] Unstable	13 (46.6)	11 (34.4)	
[b] Stable	9 (32.1)	15 (46.9)	
[a] Family History	4(14.3)	2(6.5)	0.320^{NS}
[a]pHTN	6(21.4)	17(53.1)	0.039^{S}
[a]CLD	1(3.6)	1(3.1)	0.923^{NS}
[a]PVD	1(3.6)	5(6.77)	0.121^{NS}
[a] Extra cardiac arteriopathy	0(0)	1(3.1)	0.698^{NS}
[a]Poor mobility	1(3.33)	0(0)	0.346^{NS}
[a]Neurological dysfunction	0(0)	1(3.1)	0.346^{NS}
[a]CVD	4(14.3)	8(25)	0.301^{NS}
[a]Previous PCI	3(10.7)	5(15.6)	0.577^{NS}
[a]Cardiogenic shock	3(10.7)	2(6.2)	0.533^{NS}
[a] MI	28 (100)	32 (100)	0.168^{NS}
[b] MI 6-24 Hr	*4(14.3)*	*2(6.2)*	
[b]MI 1-30 days	16(57.1)	16(50)	
[b]MI 31-90 days	5(17.8)	7(21.9)	
[b]MI >90 days	3(10.7)	7(21.9)	

[a]Data were analysed using Chi-Square (c^2) Test and level of significance was 0.05. Figures in the parentheses denote corresponding percentage. [b]Data showing subclass analysis. (n= number of patients, NS= Not significant, DM=Diabetes Mellitus, HTN= Hypertension, HDL= Hyperlipidaemia, pHTN= Pulmonary hypertension, CLD= Chronic liver disease, PVD= peripheral vascular disease, CVD=Cerebro Vascular disease, PCI= percutaneous coronary intervention, MI= myocardial Infarction)

Table-III

Post operative outcome variables

Characteristics	Group-A (n=28)	Group-B (n=32)	P value
#No of Distal anastomoses	3.36± 0.138	3.28± 0.144	0.626^{NS}
#Ventilation (Hr)	24.46± 6.064	30.25± 10.491	0.652^{NS}
#Total ICU stay (Hr)	48.93± 7.676	79.75± 17.924	0.203^{NS}
#Total Step Down stay (Hr)	37.64± 3.622	33.88± 4.006	0.193 ^{NS}
#Pre-op stay (Days)	4.11± 0.772	3.81± 1.048	0.361 ^{NS}
#Post-op stay (Days)	10.82± 1.844	17.62± 2.065	0.056 ^{NS}
#Total Hospital stay (Days)	14.93± 1.858	21.44± 2.472	0.037^{S}
[a] Reopening	1(3.6)	1(3.1)	0.923^{NS}
[a] Extubation (<24Hr)	24(85.7)	27(84.4)	0.885^{NS}
[a] Reintubation	2(7.1)	1(3.4)	0.532^{NS}
[a] Status at 30 days (alive)	26(92.9)	30(93.8)	0.890^{NS}
[a] Readmission (90 days)	6(21.4)	5(15.6)	0.562^{NS}
#Ejection fraction(3 months)	56.93± 7.666	41.50± 6.735	0.621^{NS}
# LVIDd (mm) (3 months)	53.15± 3.231	59.47± 4.200	0.146^{NS}
#LVIDs (mm) (3 months)	41.52± 2.847	44.47± 3.636	0.089^{NS}
[a] NT-proBNP (Highest value)	8(28.6)	7(21.9)	0.550^{NS}
[a] Troponin-I (Highest value)	5(17.9)	5(15.6)	0.817^{NS}
[a] RWMA (3 months)	10(40.7)	4(13.3)	0.001^{S}
[a] TVI (3 months)	2(7.7)	3(6.9)	0.910^{NS}
[a] CFM (3 months)	3(11.5)	4(10.3)	0.887^{NS}

Data were analysed using Student's t-Test. [a] Data were analysed using Chi-Square (c^2) Test. Level of significance was 0.05. Figures in the parentheses denote corresponding percentage. (n= number of patients, S= Significant, NS= Not significant, LVIDd= Left ventricular end diastolic diameter, LVIDs= Left ventricular end systolic diameter, RWMA= Regional wall motion abnormality, TVI= Tissue velocity index, CFM= Colour flow mapping.

including renal failure and arrythmia were equally high in both the groups (p=0.673). Although the rate of morbidity was higher in both the groups the status of the patients at 30 days was found better.

Discussion

The present study was designed to compare the LV function for highly selective group of patients undergoing coronary revascularization surgery to find the answer of the research question "Preserved LV function shows better outcome with Intra-aortic balloon counter pulsation therapy". We matched the pre-operative clinical characteristics of both the groups apart from Echocardiographic LV function parameters. Clinical characteristics which has potential influence in the outcome of coronary artery bypass surgery were evaluted

and found similar to the studies reported by Torchiana[3] et al, Barron[4] et al,Sanfelippo [11] et al.Accordingly, the effort in this study was to find out difference in IABP outcome in preserved and poor LV function group at coronary revascularization surgery.

We extensively studied the left ventricular function and evaluated both the groups with a number of post-operative chemical biomarker. NTproBNP, which is a strong biomarker for heart failure has been evaluated in both the groups. Comparison of highest recorded value was high in 28.6% patient in Group A and 21.9% in Group B (p=0.550). Troponin-I was also recorded in a similar fashion as NTproBNP. Post operative 2D Echocardiography (within 3 months at follow up) was done in all surviours to assess regional wall motion abnormality, Tissue velocity index and color flow mapping by using GE Vivid Pro-7^{R}. No significant difference been observed between the groups. RWMA showed significant differnce between the groups. A significant improvement noted in Group B, which justifies well known benefit of coronary revascularizarion.

Duration of hospital stay among the survivors was 14.93± 1.858 days vs 21.44± 2.472 which was statistically significant. Similar results been demonstrated in randomized trials, reported by Ohmanet al[8]. Apart from this all other peri-operative outcome variables were non-significant between the groups when compared to other published reports. Overall mortality in patients receiving intraoperative or postoperative IABP reported Baskettet al in 2002 was higher than our result[15]. About 93% patients of Group A were alive at 30 days in comparison with 93.8% of Group B (Table-3).

This is a single centre non-randomized study. A multivariate regression analysis was not done, which we believe could be useful to verify the profound cause-effect-outcome. We applied blinding (The Echocardigraphers were blinded towards the grouping) but the sample sizewas small due to short duration (1year)and non-funded post-graduation study oriented research.

Conclusion

This study shows that, use of IABP in preserved LV function patients does not show any survival benefit at 30 days and no difference in outcome in terms of LVEF, LVIDd, and LVIDs when measured with TVI and CFM.The results of this study and discussion thereof prompt us to recommend that there is no significant advantage in terms of LV function in patients with coronary revascularization requiring IABP.

Intra-aortic balloon pump is a life-saving assist device and its use should be considered in myocardial revascularization surgery, when indicated. A judicious use of IABP is life saving and need to preserve its use for the appropriate cases. Given its survival benefit, surgeons must use IABP in a pre-planned way. Here by the recommendation is the use of risk prediction scorefor patient undergoing coronary revascularization surgery is useful.

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Original Article

Prediction of Reperfusion and Infarct-Related Artery Patency after Thrombolysis in Acute Anterior Myocardial Infarction by Degree of P Wave Dispersion on ECG

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Abstract

Background: The prognosis of patients with persistent occlusion of the infarct related artery (IRA), despite lytic therapy is poor. Early detection of successful reperfusion and IRA patency is of great importance in terms of prognosis and identification of candidates for rescue percutaneous coronary intervention (PCI). P wave dispersion (PWD), a new parameter measured before and after fibrinolytic therapy (FT) is supposed to predict successful reperfusion in patients with anterior acute myocardial infarction (AMI).

Objectives:To examine the prediction of successful reperfusion and infarct related artery (IRA) patency by measuring P wave dispersion in 12-lead surface ECG.

Method:132 patients were selected and divided into two groups on the basis of ST segment resolution (STR) after 120 minutes of thrombolysis. Group I: patients with STR >70%; Group II: patients with STR < 70%. All patients underwent coronary angiography (CAG). IRA patency was considered if TIMI flow grade was >2.

Results: Mean age of the successfully thrombolysed group was 49.12±9.54 and mean age of failed thrombolysis group was 52.08±8.23 years. Though higher age was associated with failed thrombolysis and it was statistically insignificant (p=0.06). Patients with higher BMI showed no significant difference in thrombolysis.

It was observed that diabetes mellitus and dyslipidemia were significantly higher in group II patients (p=0.04 and p=0.03, respectively). The mean level of PWD after 120 minutes of thrombolysis (PWD120) was statistically significant (p=0.001) between two groups. After multivariate regression analysis PWD120 was found to be the significant predictor of ST segment resolution as well as IRA patency (OR = 1.101; 95% CI = 1.012 – 1.240; p = 0.01).

Conclusion: P wave dispersion (PWD) in patients receiving thrombolytic therapy can be a predictor of successful reperfusion and patent infarct related artery (IRA). PWD values, in combination with other reperfusion parameters, can contribute to the identification of rescue PCI candidates.

Key words: Myocardial Infarction, Reperfusion, ECG, Streptokenase.

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Introduction

Achieving optimal coronary flow following thrombolysis in myocardial infarction (TIMI) reduces mortality, preserves left ventricular function and improves survival following acute myocardial infarction (AMI).[1,2] The prognosis of patients with persistent occlusion of the infarct related artery (IRA), despite lytic therapy is poor compared with that of patients with recanalized coronary arteries. Therefore, early detection of successful reperfusion and IRA patency in patients who received thrombolytic therapy is of great importance in terms of prognosis and identification of candidates for rescue percutaneous coronary intervention (PCI).[3]

For this purpose, some parameters such as: relief of chest pain, early peak of cardiac biomarkers, appearance of reperfusion arrhythmia and various electrocardiographic (ECG) changes are used as noninvasive tools, among which ST segment resolution at 90 minutes is one of the most important markers of successful reperfusion and prognosis.[4]

P wave dispersion (PWD), a parameter measured before and after fibrinolytic therapy (FT) is able to predict successful reperfusion in patients with acute anterior MI.[5] The P-max is the longest atrial conduction time and P-min is the shortest atrial conduction time measured in any of the 12 leads of the surface ECG.[6] PWD is calculated by subtracting the minimum P-min from the P-max.[7] A pathological P-wave duration is considered as ≥120 msec.[8]

PWD was found to be significantly increased during the anginal episodes irrespective of the presence of history of a previous myocardial infarction.[9] Furthermore, PWD showed higher values during the anginal episode in patients with left ventricular dysfunction independently of the presence of a previous myocardial infarction.[10] PWD at 120 minutes is significantly lower in patients with successful reperfusion and patent IRA.[5] P-max and PWD is higher in slow coronary flow patient.[11]

Methods:

This was an observational study conducted in Department of Cardiology, National Institute of Cardiovascular Diseases, Dhaka, Bangladesh from July 2013 to July 2014. After judging against inclusion and exclusion criteria 132 AMI (Anterior) patients were divided into two groups on the basis of ST Segment resolution (STR) after 120 minutes of thrombolysis. Group I: patients with STR >70%; Group II: patients with STR < 70%.

Streptokinase was used as a thrombolytic agent. 12 lead resting ECG was done at a paper speed of 25 mm/s and 10 mm standardization. All recordings were performed in the same quiet room during spontaneous breathing, following 20 minute of adjustment in the supine position. ST-segment deviation was measured with a handheld caliper and magnifying glass at 80 milliseconds after the J-point in all available leads. The TP-segment was considered the preferred iso-electric baseline and ST segment deviation was measured to the nearest 0.05 mV. ST segment resolution was calculated and expressed as a percentage with this formula: (baseline ST elevation-120 minute ST elevation)/baseline ST elevation.

ECGs were recorded before, 90 minutes and 120 minutes after onset of thrombolysis. The onset of the P wave was defined as the point of first visible upward slope from baseline for positive waveforms and as the point of first downward slope from baseline for negative waveforms. The return to the baseline was considered as the end of the P wave. Biphasic P waves were measured to the time of final return to baseline. If the onset or offset of the P wave were not clearly determined the lead was excluded from the analysis. P wave duration measurements were obtained manually by using calipers and magnifying lens for accurate definition of the ECG deflection. PWD of both groups was measured by subtracting P wave minimum from P wave maximum durations.

Transthoracic echocardiography was done for chambers size, wall motion abnormality, EF%, valvular and pericardial conditions. All patients underwent coronary angiography (CAG). Anterograde perfusion of the infarct-related artery was graded according to the classification system of the thrombolysis in myocardial infarction (TIMI) trial (grade 0 = no anterograde perfusion, grade 1 = minimal perfusion, grade 2 = partial perfusion and grade 3 = complete perfusion). IRA patency was considered if TIMI flow grade was 2 or 3.

The SPSS Statistical Software (17.0 version, SPSS Inc., Chicago, Illinois, USA) was used for data analysis. Continuous variables were expressed in mean & standard deviation and categorical variables as frequency and percentage. Student's t-test was used to compare normally distributed continuous variables and for the categorical variables the chi-square test was used. Multiple logistic regression analysis was performed to assess the PWD 120 minutes after onset of thrombolysis (PWD120) as a predictor of reperfusion and IRA patency. A p-value <0.05 was considered statistically significant.

Results

Total 132 patients were studied. The mean age of the studied patients was 50.60±8.23 years. The mean age of group I was less than group II, but the difference between two groups was not statistically significant (p=0.06). Male, female ratio was 4.3:1. Male was predominant but no significant difference (p=0.82) was found between the groups.

Table-I

Comparison of the study groups by their demographic characteristics (N = 132)

Age in years	STR				Total (N = 132)		*p*-value
	Group I (n = 66)		Group II (n = 66)				
	Number	%	Number	%	Number	%	
< 40	14	21.21	11	16.67	25	18.94	[a]0.11[NS]
40 – 60	40	60.61	43	65.15	83	62.88	
> 60	12	18.18	12	18.18	24	18.18	
Mean ± SD	49.12±9.54		52.08±8.23		50.60±8.23		[b]0.06[NS]
Sex							
Male	53	80.30	54	81.82	107	81.06	[a]0.82[NS]
Female	13	19.70	12	18.18	25	18.94	

Group I= Patients with STR >70%
Group II = patients with STR < 70%
STR = ST segment resolution after 120 minutes of thrombolysis
NS= Not significant (p>0.05)
[a]p value reached from chi-squared test
[b]p value reached from unpaired t test

Total 132 patients were studied. The mean age of the studied patients was 50.60±8.23 years. The mean age of group I was less than group II, but the difference between two groups was not statistically significant (p=0.06). Male female ratio was 4.3:1. No significant difference (p=0.82) was found between the groups in terms of sex distribution

Table II

Comparison of the study groups by their risk factors (N = 132)

BM(kg/m^2)	STR				Total (N = 132)		*p*-value
	Group I (n = 66)		Group II (n = 66)				
	Number	%	Number	%	Number	%	
Normal	31	46.97	28	42.2	59	18.94	[a]0.33[NS]
Overweight	22	33.33	19	28.49	41	62.88	
Obese	13	19.70	19	28.79	32	18.18	
Mean ± SD	23.42±3.67	24.78±4.88	24.10±4.23	[b]0.06[NS]			
Risk Factors							
Smoking	45	68.18	40	60.61	85	64.39	[a]0.36[NS]
Hypertension	30	45.45	35	53.03	65	49.24	[a]0.28[NS]
Diabetes	25	37.88	37	56.06	62	46.97	[a]0.04[S]
Dyslipidemia	23	34.85	35	53.03	58	43.94	[a]0.03[S]
Family history	10	15.15	14	21.21	24	18.18	[a]0.36[NS]

Group I= Patients with STR >70%
Group II = patients with STR < 70%
STR = ST segment resolution after 120 minutes of thrombolysis
BMI = Body Mass Index
NS= Not significant (p>0.05)
S= Significant (p<0.05)
[a]p value reached from chi-squared test
[b]p value reached from unpaired t test

BMI demonstrates very close values in both groups with no significant difference between groups (p=0.33). Smoking is higher in group I than in group II (p=0.36). It was observed that diabetes mellitus and dyslipidemia were significantly higher in Group II (p=0.04, p=0.03)

Table-III

Comparison of the study groups according to P wave dispersions (n=132)

PWD (millisecond)	STR		P value
	Group I (n = 66)	Group II (n = 66)	
PWD0	48.97±10.72	51.59±8.34	0.45^{NS}
PWD90	44.24±9.12	46.98±7.44	0.19^{NS}
PWD120	40.86±7.25	47.91±6.14	0.001^{S}

Group I= Patients with STR >70%
Group II = patients with STR < 70%
PWD = P Wave Dispersion
STR = ST segment resolution after 120 minutes of thrombolysis
PWD0 = PWD at 0 mimute (before the of onset of thrombolysis)
PWD90 =PWD 90 minutes after onset of thrombolysis
PWD120 =PWD 120 minutes after onset of thrombolysis
NS= Not significant (p>0.05)
S= Significant (p<0.05)
p value reached from unpaired t test

Between the two groups, the differences of means of PWD0 and PWD90 were not statistically significant (p=0.45 and p=0.19, respectively). The difference of mean levels of PWD120 across the groups was statistically significant (p=0.001).

Table-IV

Comparison of the study groups according to infarct related artery (IRA) patency (n=132)

BMI (kg/m^2)	STR				Total (N = 132)		*p*-value
	Group I (n = 66)		Group II (n = 66)				
	Number	%1	Number	%	Number	%	
IRA patent	45	68.18	10	15.15	55	41.66	0.001^{S}
IRA occluded	21	31.82	56	84.85	77	58.44	

Group I= Patients with STR >70%
Group II = patients with STR < 70%
STR = ST segment resolution after 120 minutes of thrombolysis
IRA = Infarct Related Artery
S= Significant (p<0.05)
p value reached from chi-square t test

It was observed that IRA patent patients were more in group I than group II (68.18% vs. 15.15%) which was statistically significant (p=0.001).

Table V

Multivariate logistic regression of determinants of ST-segment resolution

Variables of interest	β	S.E.	P value	OR	95% CI
Smoking	0.253	0.441	0.56^{NS}	1.288	0.543 – 3.055
Hypertension	0.701	0.501	0.10^{NS}	1.066	0.519 – 2.503
Diabetes mellitus	0.367	0.506	0.46^{NS}	1.444	0.535 – 3.892
Dyslipidemia	0.203	0.249	0.66^{NS}	0.816	0.325-2.054
PWD120	0.912	0.654	0.01^{S}	1.101	1.012 – 1.240

Dependent variable: ST-segment resolution
Independent variables; smoking, hypertension, diabetes mellitus, dyslipidemia and PWD120
S = Significant β = b error OR = Odds ratio
NS = Not significant SE = Standard error CI = Confidence interval

The binary logistic regression analysis of Odds Ratio for characteristics of the subjects likely to develop ST segment resolution, among different variables, PWD120 were found to be the significant predictors to develop ST segment resolution (95% CI: 1.000 – 1.260 ; p=0.03).

Table-VI

Multivariate logistic regression of determinants of infarct related artery patency

Variables of interest	β	S.E.	P value	OR	95% CI
Smoking	0.253	0.441	0.56^{NS}	1.288	0.543 – 3.055
Hypertension	0.701	0.501	0.10^{NS}	1.066	0.519 – 2.503
Diabetes mellitus	0.367	0.506	0.46^{NS}	1.444	0.535 – 3.892
Dyslipidemia	0.203	0.249	0.66^{NS}	0.816	0.325-2.054
PWD120	0.912	0.654	0.01^{S}	1.101	1.012 – 1.240

Dependent variable: infarct related artery patency
Independent variables: smoking, hypertension, diabetes mellitus, dyslipidemia and PWD120
S = Significant β = b error OR = Odds ratio
NS = Not significant SE = Standard error CI = Confidence interval

The binary logistic regression analysis of Odds Ratio for characteristics of the subjects likely to cause IRA patency, among different variables, PWD120 was found to be the significant predictor of IRA patency (95% CI: 1.012 – 1.240; $p=0.01^{S}$).

Discussion

In this study, the mean age of the successfully thrombolysed group was 49.12±9.54 and mean age of failed thrombolysis group was 52.08±8.23 years. Though higher age was associated with failed thrombolysis it was statistically insignificant (p=0.06). In a similar study conducted by Karabag et al. observed that the mean age was higher in failed thrombolysis group.[5] Successful thrombolysis had higher percentage of male though statistically not significant (p=0.82). Another studyshowed the similar higher percentage of male in successful thrombolysed group.[6] Patients with higher BMI demonstrated successful thrombolysis as was found in the similar study conducted by Mahmoud.[6]Among the studied patients, hypertension, diabetes mellitus, dyslipidemia and family history of IHD were higher in group II and smoking was higher in group I. It was also observed that diabetes mellitus and dyslipidemia were significantly higher in Group II (p=0.04, p=0.03).Another study conducted by Mahmoud 2012, similar results observed in Blood glucose level (78.1±4), (p= 0.28); LDL level(113±9.3), (p=o.o8); and triglyceride level (162.8±23), (p=0.76) in failed reperfusion group which were similar to this study.[6]

The mean level of PWD120 was statistically significant (p=0.001).Similar observation was conducted by Karabag et al., 2012 showed that the mean PWD at 120 ms in both groups with AMI (Anterior)were statistically significant (p=<0.001).[5]The study conducted by Dilaveris PE, et al., 2006 showed that PWD was significant betweenthe groups of during spontaneous angina periodand asymptomatic period, P < 0.001[12].Another study by Mahmoud, K, 2012 to evaluate PD, PWD and QT dispersion (QTD) in patients with Coronary Slow Flow (CSF) and its relationship between thrombolysed MI patients group and control group where CSF patients had significant PWD (P=0.001).[6]

The multivariate regression analysis of odds ratios for characteristics of the subjects likely to cause IRA patency was studied. Out of the 5 variables, PWD120 was found to be the significant predictor of ST segment resolution as well as IRA patency. Karabag et al. also showed that PWD120 could predict IRA patency and ST-segment resolution on ECG (OR: 0.907, CI: 0.856 to 0.960; p=0.001; OR: 0.942, CI: 0,896 to 0,991; p=0.02, respectively).[5]

Conclusion

From this study, it may be concluded that low P wave dispersion (PWD) in patients receiving thrombolytic therapy can be a predictor of successful reperfusion and patent infarct related artery (IRA). PWD values, in combination with other reperfusion parameters, can contribute to the identification of rescue PCI candidates.

Study Limitations:

This was an observational study on patients who presented to hospital with acute MI (anterior) and who refused the option of primary PCI. We use streptokinase for thrombolysis which was less superior to other thrombolytics like tenecteplase due to unavailability. Purposive sampling was done instead of random sampling method in my study. Although 90 minutes after thrombolytic therapy is standard time for rescue PCI in most centers, PWD was measured at 120 minutes in our study. Most of our hypertensive patients were on antihypertensive medications. We could not exclude patients who were using drugs that might affect atrial conduction and PWD like antihypertensive agent.

Recommendations

Further prospective studies are needed to assess the temporality of the association between P wave dispersion (PWD) value and successful reperfusion and IRA patency by ECG following thrombolysis of acute MI (Anterior) patients. Similarly, in future randomized clinical trials using large number of patients may be used.

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Original Article

Presentation, Management Practices and In-hospital Outcomes of Patients with Acute Coronary Syndrome in a Tertiary Cardiac Centre in Bangladesh

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Abstract

Background: There is no large-scale data on the management practices and in-hospital outcomes of acute coronary syndromes (ACS) in Bangladesh. This study aimed to document the presentation characteristics, treatment practices and in-hospital outcomes of ACS patients presenting to a specialized tertiary cardiac care institute in Bangladesh.

Methods: This retrospective observational study included all ACS patients presenting to Ibrahim Cardiac Hospital & Research Institute (ICHRI), Dhaka, Bangladesh, over the period of January 2013 to December 2013. Data were collected from hospital discharge records and catheterization laboratory database, and analysis was carried out using Statistical Package for Social Sciences (SPSS) version 16.0 (Chicago, Illinois, USA).

Result: A total of 1914 ACS patients were included. The mean age was 57.8 ± 12.1 years. 71.4% were male. 39.8% presented with ST-elevation myocardial infarction (STEMI), 39.7% with non- ST-elevation myocardial infarction (NSTEMI) and 20.5% presented with unstable angina (UA). 68.91% were diabetic, 74.24% hypertensive, 53.23% were dyslipidaemic, 25.75% were smokers and 20.72% had chronic kidney disease (CKD).1022 (53.4%) of all admitted ACS patients underwent coronary angiography, among whom 649 (33.9%) were advised percutaneous coronary intervention (PCI), and 198 (10.3%) and 207 (10.8%) were advised coronary artery bypass graft (CABG) surgery and medical management respectively. PCI was performed in 509 patients (26.6%)during the index admission. The majority of these patients were those of STEMI (39.23%), among whom 47 (6.2%) underwent primary PCI. 146 (7.6%) of the patients presenting with ACS expired during hospital stay. Mortality was highest among STEMI (10.5%), followed by NSTEMI (8.3%) and UA (1%). 501 (26.2%) patients developed left ventricular failure, 108 (5.6%) patients developed shock and 265 (13.8%) developed acute kidney injury.

Conclusion: This study represents one of the larger single-centre analyses of ACS patients in Bangladesh thus far. Our patients have high prevalence of cardiovascular risk factors, particularly diabetes and hypertension. There is room for further improvement in terms of guideline-directed medical and interventional treatment modalities, in order to improve outcomes.

Key words: Acute coronary syndrome, Outcomes, Bangladesh.

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Introduction

Cardiovascular disease (CVD) is a growing epidemic in South Asia, and is the leading cause of mortality in the Indian subcontinent[1], as well as Bangladesh[2].Acute coronary syndromes (ACS) are responsible for a large number of emergency hospital admissions and mortality, and represent the principal form of clinical presentation of coronary artery disease (CAD). Estimates from the Global Burden of Disease Study suggest that the South Asian region will have more

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individuals with atherothrombotic cardiovascular disease than any other region by the year 2020[1]. Most notable features of CAD in South Asian populations are extreme prematurity, increased severity, hospitalization and mortality[2,3].

The current understanding of the aetiology of ACS involves plaque erosion or rupture in response to inflammation, leading to local occlusive or non-occlusive thrombus[4]. Depending on the degree and reversibility of this dynamic obstruction, the clinical manifestations of ACS comprise a continuous spectrum of risk that progresses from unstable angina (UA) to non-ST-segment elevation myocardial infarction (NSTEMI) and ST-segment elevation myocardial infarction (STEMI)[5].

A number of national and multi-national registries across the globe, including in Asia, have investigated the clinical characteristics and treatment-related outcomesamong ACS patients[6-26]. These data have shown regional variation in the clinical presentations, use of invasive procedures and outcomes across the spectrum of ACS, across different regions of the world.In the South Asian region, two large registries in India[7-8] have documented the demographic characteristics, treatment practices and outcomes of ACS patients.

There are limited data onthe presentation and outcomes of ACS from Bangladesh, with most of the studies being small ones, restricted to a particular subset of ACS patients[27-29].A large-scale ACS registry of Bangladeshi patients is a timely necessity. This study aimed to document the characteristics, treatment practices and outcomes of ACS patients presenting to a tertiary cardiac care institute in Bangladesh.

Methods

Patient population and definitions: This was a cross-sectional retrospective analysis of all patients who presented with the diagnosis of ACS to Ibrahim Cardiac Hospital & Research Institute (ICHRI), Dhaka, Bangladesh. All consecutive patients with a final diagnosis of ACS comprising of either STEMI, NSTEMI and UA were included in the study. Diagnosis of the different types of ACS and definitions of data variables and outcomes were based on ACCF/ AHA data standards[30].

Data collection: Demographic characteristics, risk factors, baseline clinical parameters, treatment modalities and medication administered, angiographic profiles, revascularization techniques and in-hospital outcomes were documented on a case report form (CRF) by study investigators. Data were derived from hospital in-patient clinical notes, discharge summaries and cardiac catheterization laboratory database.

Statistical analysis: Data analyses were carried out using Statistical Package for Social Sciences(SPSS) version 16.0 (Chicago, Illinois, USA). Continuous variables were expressed as mean ± standard deviation, and compared using the Student's t-test and ANOVA statistics. Categorical variables were expressed as number with corresponding percentage, and compared using the chi-square test.A p value < 0.05 was considered statistically significant.

Ethical approval: The study complied with the Declaration of Helsinki and ethical approval was obtained by the ethical review committee of ICHRI, Dhaka, Bangladesh.

Results

Demographic characteristics, key risk factors, and clinical presentation

A total 5502 patients were admitted during the period from January 2013 to December 2013, of whom 1914 (34.8%) presented withACS.The demographic details and baseline patient characteristics are presented in Table 1. The mean age of participants was 57.8 ± 12.1 (range 21-97) years. The majority of the patients (51.7%) were between the ages of 45- 64 years, with 17.1% <45 years of age. 1366 patients(71.4%) were male. Almost equal numbers of patients presented with STEMI and NSTEMI (39.8% and 39.7% respectively). 392 (20.5%) patients presented with UA. Diabetes (68.91%), hypertension (74.24%) and dyslipidaemia (53.23%) were the leading risk factors for CAD. Smoking and stroke were more common among patients with STEMI ($p<0.001$). Diabetes, prior myocardial infarction (MI) and chronic kidney disease (CKD)were significantly more frequent among those presenting with NSTEMI, while prior percutaneous coronary intervention (PCI), prior coronary artery bypass graft (CABG) surgery and hypertension were more common among those presenting with UA ($p<0.001$). 79.5% of patients had positive cardiac biomarkers at presentation. 79.1% of patients presented with chest pain, a symptom which was approximately equally observed across the whole spectrum of ACS, albeit slightly lesser among those with NSTEMI (42.3%). However, NSTEMIpatients tended to present the most frequently with dyspnoea (42.3%) in comparison with STEMI (24.5%) and UA patients (28.3%). This was reflected further by the increased incidence of left ventricular failure (31.9%) seen among NSTEMI patients.

In-hospital diagnostic evaluations and management

1022 (53.4%) of the 1914 admitted ACS patients underwent coronary angiography during index hospitalisation.Left main stenosis >50% and severe graft vessel stenosis was observed significantly more among NSTEMI patients (3.4% and 1.3% respectively, $p<0.001$). Significant stenosis of left anterior descending (LAD) and right coronary artery (RCA) were seen most frequently among STEMI patients (Table 2).

Table-I

Patient level characteristics in presentation, by ACS type

Parameter	TotalN (%)	STEMIn (%)	NSTEMIn (%)	UAn (%)	p value
Total ACS patients	1914	762 (39.8)	760 (39.7)	392 (20.5)	
Demographics					
Age, years	57.8±12.1	55.6 ± 11.8	60.2 ± 12.2	57.9 ± 11.6	<0.001
<45	327 (17.1)	172(22.5)	97(12.8)	58(21.2)	<0.001
45-64	989 (51.7)	401(52.6)	378(49.8)	210(53.6)	
65-74	382 (20)	125(16.4)	174(22.9)	83(21.2)	
e”75	216 (11.3)	65(8.5)	110(14.5)	41(10.5)	
Sex: male gender	1366 (71.4)	587(77.1)	525(69.0)	254(64.8)	<0.001
BMI	25.6 ± 3.7	25.4 ± 3.6	25.6 ± 3.8	26.2 ± 3.9	0.033
Admitted on holidays	123 (6.4%)	48(6.3)	46(6.0)	29(7.4)	0.664
Key Risk factors					
Diabetes	1319 (68.91)	495(65.0)	556(73.3)	267(68.1)	0.003
Hypertension	1421 (74.24)	518(68.1)	590(77.5)	313(79.8)	<0.001
Tobacco/ Smoking	493 (25.75)	256(33.6)	166(21.8)	71(18.1)	<0.001
Dyslipidaemia	1019 (53.23)	402(52.8)	391(51.4)	226(57.7)	0.124
Prior stroke	107 (5.6)	69(9.1)	37(4.9)	1(0.3)	<0.001
Peripheral vascular disease	48 (2.50)	23(3.0)	15(2.0)	10(2.6)	0.422
Chronic kidney disease	397 (20.74)	104(13.6)	229(30.2)	64(16.3)	<0.001
Previous medical history					
Prior MI	310(16.2)	80(10.5)	160(21.0)	70(17.9)	<0.001
Prior PCI	219 (11.4)	37(4.8)	107(14.1)	75(19.1)	<0.001
Prior CABG	120 (6.3)	19(2.5)	63(8.3)	38(9.7)	<0.001
Clinical features on presentation					
Admitted with chest pain	1514 (79.1%)	635(83.4)	565(74.2)	314(80.1)	<0.001
Admitted with dyspnoea	619 (32.3%)	186(24.4)	322(42.3)	111(28.3)	<0.001
HR <60bpm	165 (8.6%)	78(10.2)	61(8.0)	26(6.6)	0.087
BP <90bpm	83 (4.3%)	50(6.6)	31(4.1)	2(0.5)	<0.001
Key in-hospital investigations					
HbA1C (%)	12.7 ± 1.7	16.6 ± 3.7	9.7 ± 1.5	11.3 ± 3.4	0.182
S. creatinine (mg/dL)	1.4 ± 0.9	1.4 ± 0.9	1.6 ± 1.1	1.3 ± 0.9	<0.001
Cardiac marker positive	1521 (79.5)	761(100.0)	760(99.9)	0(0.0)	<0.001
LDL- cholesterol level (mg/dL)	98.97 ± 41.35	106.6 ± 41.9	95.2 ± 42.0	90.2 ± 35.7	<0.001
LV ejection fraction (%)	49.48± 10.92	47.1 ± 9.6	49.1 ± 11.3	55.2 ± 10.5	<0.001

Table-II

Coronary angiographic findings, by ACS type

Key	n (%)	STEMI	NSTEMI	UA	p value
Left main stenosis >50%	46 (2.3)	13 (1.7)	26 (3.4)	5 (1.3)	0.026
LAD >70%	644 (33.7)	314 (41.3)	261 (34.3)	69 (17.6)	<0.001
LCx>70%	519 (27.1)	211 (27.7)	236 (31.1)	72 (18.4)	<0.001
RCA>70%	520 (27.2)	241 (31.7)	214 (28.2)	65 (16.6)	<0.001
Ramus intermedius>70%	41 (2.1)	12 (1.6)	18 (2.4)	11 (2.8)	0.194
Graft vessel lesion >70%	16 (0.8)	1 (1)	10 (1.3)	5 (1.3)	<0.001

Overall, 649 (33.9%) patients were advised PCI, and 198 (10.3%) and 207 (10.8%) were advised CABG and medical management respectively. PCI was performed in 505patients (26.4%), the majority of whom presented with STEMI (Table3). 448 (88.7%) of those who underwent PCI received a drug eluting stent (DES).Only 47 (6.2%) of STEMI patients underwent primary PCI, 84.1% of whom received a DES.

In-hospital outcomes and predictors of mortality:

146 (7.6%) of the patients presenting with ACS expired during hospital stay (Table 4) with mortality being highest among those presenting with STEMI (10.5%), followed by NSTEMI (8.3%) andUA (1%). 501 (26.2%) patients developed LVF, significantly among NSTEMI patients (21.2%), and 108 (5.6%) of patients developed shock, significantly among STEMI patients. 265 (13.8%) of patients developed acute kidney injury (AKI). The highest incidence of CKD was observed among NSTEMIpatients (30.2%), who were also the most prone to develop AKI (16.6%).142 (7.4%) of patients (most frequently STEMI patients) required mechanical ventilation, of whom 38 were successfully extubated. Multivariate analysis revealed that age >50 years, CKD, bradycardia on admission, shock, LVF, admission with dyspnoea and STEMI were independent predictors of in-hospital mortality (Table 5)

Discharge medical therapy and prescriptions:

95.5% of ACS patients received aspirin at discharge, 93.2% in whom it was prescribed as a component of dual antiplatelet therapy (DAPT) (Table 6). Statins (82.8%) and

Table-III

In-hospital diagnostic evaluations and treatment modalities, by acute coronary syndrome type

Key	n (%)	STEMI	NSTEMI	UA	p value
Coronary angiography	1022 (53.4%)	479 (62.9)	385 (50.7)	158 (40.3)	<0.001
Advised PCI	649 (33.9)	348(45.7)	230(30.3)	71(18.1)	<0.001
PCI on same admission	505(26.4)	297 (39.0)	163(21.4)	45 (11.5)	<0.001
Among PCI, received drug eluting stent	448(23.4)	261(34.3)	148 (19.4)	39 (9.9)	<0.001
Received BMS	108 (5.6)	64 (8.4)	36 (4.7)	8 (2)	<0.001
Primary PCI done	47 (6.2)	47 (6.2)	-	-	-
Advised CABG	198 (10.4)	72(9.5)	90(11.8)	36(9.2)	0.218
CABG done same admission	7(0.4)	1(0.1)	5(0.7)	1(0.1)	0.214
Advisedmedical management	206(11.7)	56(8.2)	83(11.9)	67(17.3)	<0.001

Table-IV

In-hospital event rates, by acute coronary syndrome type

In-hospital event rates		STEMI	NSTEMI	UA	P value
Shock	107 (5.6)	69(9.1)	37(4.9)	1(0.3)	<0.001
Left ventricular failure	501(26.2)	209(27.5)	243(31.9)	49(12.5)	<0.001
Acute kidney injury	265 (13.8)	113(14.8)	126(16.6)	26(6.6)	<0.001
Required mechanical ventilation	142 (7.4)	71(9.3)	65(8.5)	6(1.5)	<0.001
Expired	146(7.6%)	79(10.4)	63(8.3)	4(1.0)	<0.001

Table-V

Predictors of in-hospital mortality among ACS patients: Multivariate analysis

Variable of interest	Odds Ratio (95% CI of OR)	p-value
Age (≥50 yrs)	2.54(1.33 – 4.85)	0.005
Chronic kidney disease	2.10(1.36 – 3.26)	0.001
Peripheral vascular disease	1.22 (0. 44- 3.39)	0.708
HR < 60/min on admission	1.8(1.03 – 3.16)	0.04
Shock	16.82(10.29 – 27.5)	< 0.001
Left ventricular failure	2.43(1.58 – 3.73)	< 0.001
Admitted on holidays	1.88 (0.96 – 3.67)	0.06
Admitted with dyspnoea	1.80 (1.15 – 2.8)	0.009
STEMI	1.92 (1.27 – 2.90)	0.002

Table-VI

Discharge medical therapy prescriptions, by acute coronary syndrome type

Discharge treatment	Totaln (%)	STEMI (%)	NSTEMI (%)	UA (%)	p value
Aspirin	1828(95.5)	749(98.3)	718(94.5)	361(92.1)	<0.001
Clopidogrel	1627(85.0)	625(82.0)	670(88.2)	332(84.7)	<0.001
Prasugrel	243 (12.7%)	146(19.2%)	71 (9.3%)	26 (6.6%)	<0.001
DAPT	1784(93.2)	738(96.9)	708(93.2)	338(86.2)	<0.001
Aspirin+ Clopidogrel	1623(84.8)	625(82.0)	670(88.2)	328(83.7)	0.003
Aspirin+ Prasugrel	243 (12.7%)	146 (19.2%)	71 (9.3%)	26 (6.6%)	<0.001
Beta-clocker	904 (47.3)	367(48.3)	430(56.5)	180(45.9)	0.005
Statin	1464 (82.8)	571(83.7)	568 (81.4)	325(83.8)	0.437
ACEI/ ARB	280 (41.1)	237(34.0)	169(43.6)	169(43.11)	0.002
Nitrate	1349 (76.3)	529(77.6)	547(78.4)	273(70.4)	0.007
Trimetazidine	1241(70.2)	497(72.9)	515(73.8)	229(59.0)	<0.001
All 4 drugs: DAPT, beta-blocker, ACE-I/ARB, statin	207 (11.7)	108(15.8)	59(8.5)	40(10.3)	<0.001

Table-VII

Comparison of characteristics of ACS patients from registries in developed and developing countries

Registry	Mean age (years)	Sex(male %)	HTN %	DM %	DL %	Smoking %	STE-MI %	NST-EMI %	UA %	CAG rates %	PCI rates %	PPCI rates %
Bangladesh	57.8 ± 12.1	71.4	74.2	68.9	53.2	25.8	39.8	39.7	20.5	53.4	26.6	6.2
Kerala ACS Registry[8]	60.4 ± 12.1	77.4	48.4	37.6	N/A	34.4	37	31	32	19.5	11.9	N/A
CREATE Registry[7]	57.5 ± 12.1	76.4	37.7	30.4	N/A	40.2	60.6	39.4*	—	23.2	7.5	
Gulf RACE Registry[16]	55 ± 12	76	46	38	31	45	39	32	29	22	N/A	7
SPACE Registry[17]	58 ± 12.9	77.4	55.3	58.1	41.4	32.4	41.5	58.5*	—	67.2	35.3	17.5
GRACE Registry [18-19]	64± 13	72	50§	21§	35§	62§	30	25	38	55	40	18
Malaysian NCVDACS Registry[11]	59 ± 12	75	72.6	55	55.9	57	42	33	25	35	46	8
CPACS Registry, China[14]	64.4	67	59.7	21.2	32.9	52.3	43	11	46	56.8§ï	52.7§ ï	16.3
TRACS Registry[13]	63.5 + 12.8	67.5	59.5	50.7	83.2	32.1	54.9	33.1	12	44.3	42.05	24.7
ACCESS Registry[21]	59	81	56.73	35.87	41.46	40.32	46	54*	—	57.85	35.29	
The Euro Heart Survey on ACS (I) [2,23]	65.2	67.5	51.6§	21.1§	46.8§	63.1§	42	51*	—	56.3§	40.4§	37
Euro Heart Survey – ACS II [23]	64.7	70.1	50.0§	21.4§	43.2§	45.6	47	48*	—	70.2§	57.8§	59
NCDR ACTION AR-G Registry[24]	60§	71.3§	62.5§	22.7§	52.2§	43.7§	-	-	-	93	81.5	83

For STEMI only * NSTE-ACS î admitted to level 3 hospital

nitrates (76.3%) were the next most commonly prescribed class of medications after antiplatelet drugs. 367 (48.3%) of patients with STEMI were prescribed beta-blockers. STEMI patients (15.8%) were the most likely to receive four drug classes known to have mortality benefit after ACS (i.e. DAPT, beta-blocker, ACE-inhibitor and statin.

Discussion

To the best of our knowledge, these data represent the largest contemporary ACS registry in Bangladesh, to date. It provides insight into the descriptive epidemiology, practice patterns and in-hospital outcomes of Bangladeshi ACS patients presenting to a tertiary cardiac centre. Table 7 represents a comparison of characteristics of ACS patients from different registries worldwide.

The mean age of our subjects was a relatively young age of 57.8 ± 12.1 years, which is comparable with those of the CREATEand middle eastern registries (GulfRACE and SPACE)[7, 16, 17],marginally lower than the Kerala ACS

registry[8] and ACCESS registry[21], but significantly younger than those of Thai ACSRegistry, GRACE, ACTION AR-G and other European registries[13, 18, 22-24], reflecting the younger presentation of ACS among Bangladeshis.

Approximately three-fourths of our ACS population was male, an observation seen across all ACS registries worldwide. In terms of risk factor distribution, 74.2% had hypertension, 68.9% had diabetes, 53.2% had dyslipidaemia and 25.8% had a history of smoking. These rates of smoking may be underestimated owing to lack of data in some patient records. Hypertension,diabetes and dyslipidaemia showed much greater incidence in our population in comparison to other Asian and Western registries. In fact, the incidence of diabetes we report may be one of the highest rates of diabetes in an ACS population, which is triple the rates reported in the multinational GRACE registry[18,19], and almost double the rates reported in Indian studies[7,8]. The presence of CKD, an additional risk factor contributing to poor outcome, was as high as 20.7% in this ACS population, possibly linked to the high prevalence of concomitant diabetes and hypertension. CKD has not been well-documented in other ACS registries, however, we found in our study that CKD posed significant mortality risk (odds ratio 2.1, p<0.001). The clustering of these co-morbidities may be responsible for ACS presentation at a much younger age in our population, as well as for the marginally increased overall mortality rate observed in our registry. Similarly, in a sub analysis of Gulf RACE registry, diabetic patients presenting with ACS were more likely to have a clustering of additional co-morbidities and were at risk of more adverse non-fatal hospital outcomes[31].

In this study, STEMI patientswere younger than those with NSTE-ACS. They had fewer risk factors, and a less frequent history of prior cardiac disease or intervention; they were, however, more often smokers, and significantly higher in-hospital mortality rate, compared to NSTEMI. These findings reflect those observed in regional registries such as CREATE, Kerala ACS and ACCESS[7,8,21], as well as those from high income countries (AR-G registries-ACS II registries)[22-24], reflecting a pattern of a generally greater co-morbidities and higher number of risk factors among NSTE-ACS patients.

There was almost equal presentation of STEMI and NSTEMI as admission diagnosis, in this series. This is in contrast to most Asian registries and the GRACE registry, where STEMI was the most common presentation of ACS[7,8,11,13,16]. In both the Euro Heart Surveys, SPACE registry and a more contemporary Indian study, NSTEMI was the more common diagnosis[9,16,22,23].53.4% of all ACS patients in our registry underwent coronary angiography. This is comparable with GRACE and Euro-Heart SurveryACS-Iregistry [18, 22, 23], and significantly higher in comparison to Indian registries, as well as Gulf RACE[7,8,16]. The higher angiographic rates could largely be driven by the relatively more affluent socio-economic status of patients being admitted in this hospital, as well as the more contemporary nature of our data. A PCI rate of 26.6% is also higher than other registries in the region, albeit substantially lower than Middle Eastern and Western registries (Table7). 43% of patients who underwent PCI had presented with STEMI, among whom only 6.2% underwent primary PCI. This relatively lower rate is comparable to Gulf RACE and Malaysian NCVD ACS registry [11, 16], but is staggeringly lower than rates of high income countries. Explanations for this lower rate are multifactorial: it may be due to the unavailability of primary PCI facilities during night hours, and also due to educational and cultural factors such as patient refusal to undergo an 'invasive' procedure immediately after admission, preferring a more conservative approach in the initial days of admission.

However, a much higher number of overall STEMI patients undergoing PCI were given a DES (84.3%), in comparison to 39% in ACCESS and 26% in GRACE[18, 21]. Of the 5.5% in whom primary PCI was done, 85.4% received a DES. This may reflect the more contemporary nature of our data and the increased use of DES over time.

93.2% of our patients received DAPT at discharge, among whom 85% were given clopidogrel, and 12.7% prasugrel as P2Y12 blocker. Compared with the Kerala registry, patients in our study were more likely to receive most key evidence-based ACS medications on discharge prescriptions, except beta-blockers, which were prescribed less (47.3% vs 62.7% in Kerala registry)[8].The lower rates of prasugrel reflect a new entry of the drug into the local arena;ticagrelor was unavailable in the country during the time of this study.

The overall in-hospital mortality rate of 7.6% is comparable to data from CREATE[7] and the Malaysian NCVD registry[11], but higher than those observed in registries from high income countries, and the Kerala registry[8]. This may be due to the increased prevalence and clustering of more than one cardiovascular risk factor among study subjects. Although NSTE-ACS patients had worse prior histories and more risk factors, their mortality was lower than STEMI patients, reflecting similar observations of prior studies[21].

Limitations

Due to the retrospective nature of the study, the data were observational, which limits our ability to evaluate causation, and correlation to prominent ACS risk scores for predicting outcomes such as the GRACE risk score and Thrombolysis in Myocardial Infarction (TIMI) risk score. Due to logistical

reasons, data collected were of in-patients, and do not take into account the highest risk patients who expired in the emergency room (ER) prior to admission; as such, mortality rates may be underestimated. The absence of follow up data and post-discharge event rates are an additional limitation.The socio-economic status of the patients was not documented, a factor that largely influences patients' ability to finance coronary angiography and PCI, both of which are important predictive factors access to health care and consequent outcome. Also, as data was limited to the capital city where patients finance care by themselves, it may not be geographically or socioeconomically representative on the entire Bangladeshi population, in terms of risk factor and mortality rates.

Conclusion

To the best of our knowledge, this study represents one of the larger single centre analyses of ACS patients in Bangladesh thus far. Bangladeshi subjects with ACS tend to be younger, with high prevalence of cardiovascular risk factors particularlydiabetes. In-hospital mortality rates were comparable to some South and East Asian registries, but higher than those of developed countries in Europe and the Americas.Management strategies were more conservative than those reported in Western populations, and there is room for further improvement in terms of guideline-directed therapy, both pharmacotherapy and interventional, in order to improve outcomes among ACS patients.

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Original Article

Association of HDL Cholesterol with In-Hospital Outcome of Patients with Acute Coronary Syndrome

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Abstract:

Background:Acute coronary syndrome is a cardiac emergency. It is increasing dramatically and becoming a major burden in our health care system. Relation between serum lipid profile and acute coronary syndrome is well established. Our study tried to reveal association of high density lipoprotein cholesterol (HDL-C) with in-hospital outcome of patients with acute coronary syndrome. Methods: The study was a cross sectional comparative study. Clinical & biochemical evaluation was done in hospital settings. A total number of 271 patients were included in the study and divided into two groups. Patients with low HDL-C level were in group I and patients with normal HDL-C were in group II. Results: Group I populations had more complications & more in- hospital stay than group II (74.3% vs 28.9%, P<0.001 and 6.65±2.04 days vs 5.09±1.44 days, p<0.001 respectively). Conclusion: The study revealed significant association of HDL-C with outcome of acute coronary syndrome patients. Complications of acute coronary syndrome were more in patients with low HDL-C level.

Key words:Acute Coronary Syndrome, Ischemic Heart Disease, HDL Clesterol

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Introduction:

Coronary artery disease (CAD) has become a major health problem and is the most common cause of mortality and morbidity in the entire world[1]. Among the CAD, acute coronary syndrome (ACS) is the leading cause of death in developed countries and second leading cause of death in developing countries and by the year 2020, CAD will hold the first place in the WHO's list of leading cause of disability[2]. The progressively increasing trend of the disease in our country shows that the prevalence of CAD in our country was 3.3/1000 in 1976 and 17.2/1000 in 1986 indicating a 5 fold increase in 10 years. CAD is becoming a significant burden on health care services in Bangladesh[3]. It is a multifactorial disease involving well-known risk factors such as age, male sex, smoking, hypertension, diabetes mellitus, renal impairment, obesity, hypercholesterolemia, family history of premature CAD and sedentary life style[4]. Preexisting atherosclerotic plaque rupture with superimposed thrombosis in epicardial coronary arteries is by far the most frequent underlying cause of ACS[5]. There is consistent epidemiological and clinical evidence showing low HDL- cholesterol to be a strong independent risk factor for coronary heart disease (CHD), likely due to reverse cholesterol transport, anti-inflammatory and antioxidant effects of HDL[6,7]. Low HDL-cholesterol level is strongly associated with increased risk of in-hospital mortality and adverse cardiac events in patients with ACS[8-11]. Patients

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from South Asia have a distinct cardiovascular risk profile with profound health consequence. The genesis of this risk is multifactorial of which lower level of HDL-C is an important culprit.[12] These observations emphasize the need for studies evaluating impact of low HDL-cholesterol on the outcome of hospitalized patients with ACS in Bangladesh. The aim of this study is to evaluate the association of HDL-C with in-hospital outcome of ACS patients in our setting.

Methods:

This cross sectional comparative study was conducted at the Department of Cardiology, Dhaka Medical College Hospital from April 2011 to March 2012 with the objective to assess association of HDL cholesterol (HDL-C) with in-hospital outcome of patients with acute coronary syndrome (ACS). Study population was all the patients with ACS admitted into the Department of Cardiology, Dhaka Medical College Hospital within the study period. Patients having previous history of ACS/Percutaneous Coronary Intervention/ Coronary Artery Bypass Grafting, cardiomyopathy, congenital heart disease, valvular heart disease and patients with serious co-morbid conditions were excluded. After fulfilling the inclusion and exclusion criteria index patients were included. Fasting serum lipid profile was measured within 24 hours of the event by standard procedure. Level of serum HDL-C was grouped as follows:

Group I: with HDL-C level
In male - <40mg/dl
In female - <50mg/dl

Group II: with HDL-C level
In male - ≥40mg/dl
In female - ≥50mg/dl

Patients were evaluated both clinically & by investigation from the time of selection till discharge (giving more importance on rate, rhythm & character of pulse and measuring blood pressure regularly; measuring serum electrolyte, serum troponin-I level, ECG monitoring & echocardiographic findings). In-hospital outcomes of all the patients were evaluated as outcome variables (heart failure, arrhythmias, second degree/ third degree heart block, cardiogenic shock, duration of hospital stay and death).

Data was collected properly & systematically analyzed by using SPSS version 12. Test statistics used to analyze the data were descriptive statistics, chi square and unpaired t-tests. Level of significance was set at 0.05.

Results:

There were no statistically significant difference between two groups regarding age, sex, traditional risk factors, clinical diagnosis & family history. Distribution of patients was same. Regarding symptoms, presentation with chest pain between two groups was not significant (p=0.068). However, significantly higher number of patients of group I presented with breathlessness than patients of group II (P=0.001). Conversely, significantly more number of patients of group II presented with chest discomfort than patients of group I (p=0.033). Type of myocardial infarction between two groups was not statistically significant. Heart rate of group I was significantly higher than group II (p= 0.005). Ejection fraction was significantly lower in group I than group II (p=0.032). Regarding biochemical parameters, difference in fasting blood glucose & serum creatinine was not statistically significant between two groups (p= 0.557 & 0.797 respectively).

In the contrary, serum troponin I concentration in group I was significantly higher than group II (p=0.032). Mean serum total cholesterol and serum triglyceride were significantly more in group I than group II (p<0.001 and p=0.002 respectively). Similarly mean LDL cholesterol was significantly more in group I than group II (p= 0.002).

However, mean HDL cholesterol was significantly less in group I than group II (p<0.001). Regarding in- hospital outcomes, patients of group I significantly developed heart failure (23.5% vs 8.9%, p= 0.029), arrhythmia (15.5% vs 4.4%, p= 0.049) and cardiogenic shock (12.4% vs 2.2%, p= 0.044) than group II. There is no statistically significant difference in mortality (p= 0.287), cardiac arrest (p=0.631) & heart block (p=0.409) between two groups. Group I patients stayed at hospital for significantly more days than group II patients (p<0.001).

Table-I

Distribution of the study subjects according to different clinical presentation

Clinical presentation	Groups			p
	Group I (n=226) n (%)	Group II (n=45) n (%)	Total (n=271) n (%)	
Chest pain	148(65.5%)	23(51.1%)	171(63.1%)	0.068
Breathlessness	76(33.6%)	4(8.9%)	80(29.5%)	0.001
Chest discomfort	64(28.3%)	20(44.4%)	84(31.0%)	0.033

Table-II

Distribution of study subjects according to clinical diagnosis

Clinical diagnosis	Groups			P
	Group I (n=226)	Group II (n=45)	Total (n=271)	
	n (%)	n (%)	n (%)	
NSTEMI	44(19.5%)	10(22.2%)	54(19.9%)	0.914
STEMI	119(52.7%)	23(51.1%)	142(52.4%)	
Unstable angina	63(27.9%)	12(26.7%)	75(27.7%)	

NSTEMI=Non ST- segment elevation myocardial infarction.

STEMI= ST- segment elevation myocardial infarction.

Table-III

Distribution of the study subjects according to type of myocardial infarction

Type of MI	Groups			p
	Group I (n=163)	Group II (n=33)	Total (n=196)	
	n (%)	n (%)	n (%)	
Anterior MI	93(57.1%)	15(45.5)	108(55.1%)	0.381
Inferior MI without RV infarction	40(24.5%)	13(39.4%)	53(27.0%)	0.079
Inferior MI with RV infarction	30(18.4%)	5(15.1%)	35(17.9%)	0.656

MI = Myocardial infarction, RV= Right ventricle

Table-IV

Distribution of the study subjects by traditional risk factors

Traditional risk factors	Groups			P
	Group I (n=226)	Group II (n=45)	Total (n=271)	
	n (%)	n (%)	n (%)	
Smoking	115(50.9%)	30(66.7%)	145(53.5 %)	0.053
Hypertension	111(49.1%)	19(42.2%)	130(48.0%)	0.398
Diabetes mellitus	80(35.4%)	18(40.0%)	98(36.2%)	0.557
Family history of CAD	28(12.4%)	10(22.2%)	38(14.0%)	0.083
Renal impairment (serum creatinine level >1.4mg/dl)	33(15.0%)	3(7.0%)	36(13.3%)	0.152

CAD= Coronary artery disease.

Table-V

Distribution of study subjects according to hemodynamic status (n=271)

Hemodynamic status	Groups		P
	Group I(n=226)	Group II(n=45)	
	mean ±SD	Mean ±SD	
Pulse (beat/min)	88.20±15.43	81.33±10.95	0.005
SBP (mmHg)	130.12±26.02	127.82±18.45	0.599
DBP (mmHg)	80.66±14.95	77.77±11.69	0.254
Ejection fraction (%)	45.17±11.47	51.25±9.0	0.032

SBP- Systolic blood pressure, DBP- Diastolic blood pressure.

Table-VI

Distribution of study subjects according to fasting lipid profile (n=271)

Fasting lipid profile	Groups		P
	Group I(n=226) mean ±SD	Group II(n=45) mean ±SD	
Total cholesterol (mg/dl)	184.39±47.43	151.91±43.25	0.000
LDL cholesterol (mg/dl)	94.03±27.86	80.00±22.78	0.002
HDL cholesterol (mg/dl)	30.51±5.75	44.36±5.22	0. 000
Triglyceride (mg/dl)	204.00±98.46	153.42±99.07	0.002

LDL- Low density lipoprotein, HDL- High density lipoprotein

Table-VII

Comparison of individual in-hospital outcome between two groups (n=271)

Individual in-hospital outcome	Groups		Total(n=271)	P
	Group I(n=226) n (%)	Group II(n=45) n (%)	n (%)	
Heart failure	53(23.5%)	4(8.9%)	57(21.0%)	0.029
Arrhythmia	35(15.5%)	2(4.4%)	37(13.7%)	0.049
Heart block	18(8.0%)	2(4.4%)	20(7.4%)	0.409
Cardiogenic shock	28 (12.4%)	1(2.2%)	29(10.7%)	0.044
Cardiac arrest	20(8.8%)	3(6.7%)	23(8.5%)	0.631
Death	14(6.2%)	1(2.2%)	15(5.5%)	0.287

Discussion:

The study was intended to assess association of HDL cholesterol with in- hospital outcome of patients with acute coronary syndrome. Among the total 271 patients with ACS, we found that 226 (83.4%) patients had low HDL cholesterol level. Roe et al. (2008) found that among NSTE-ACS patients, 18.1% had very low & 34.5% had low HDL cholesterol level, which is a bit lower than our finding. Our study revealed that among total patients, total number of male patients was more than total number of female patients (72.7% vs 27.3%). Our observation was supported by Al-Rasadi et al. (2011), (77% vs 23%) and Faizal et al. 2009) (80.63% vs 19.37%). We found that chest pain was the most common presentation in both groups of patients. The difference in presentation with chest pain between two groups was not statistically significant (65.5% vs 51.1%, p= 0.068). However, significantly higher number of patients of group I presented with breathlessness than patients of group II (33.6% vs 8.9%, p=0.001). Conversely, significantly more number of patients of group II presented with chest discomfort than patients of group I (44.4% vs 28.3%, p=0.033). Our findings were supported by Khan and Mojumder (2009). Our study revealed that the difference in the history of smoking, hypertension, diabetes mellitus & family history of CAD were not statistically significant. The observation of the current study was supported by the findings of Khan & Mojumder (2009), Al-Rasadi et al. (2011), Manurung (2006), Faizal et al. (2009).

Our study showed that haemodynamic status was poor in patients of group I. The mean pulse rate of group I was significantly higher than patients of group II (p= 0.005). There were no statistically significant difference in mortality, cardiac arrest and development heart block between two groups (p>0.05). Any complication developed in 168 (74.3%) patients in group I and 13 (28.9%) patients in group II. Patients of group I significantly developed more complications than group II (p<0.001). The mean ± SD hospital stay of group I patients was significantly higher than patients of group II (6.65±2.04 vs 5.09±1.44 days, p<0.001). These findings were supported by the findings of Al-Rasadi et al. (2011), Faizal et al. (2009), Wolfram et al. (2006), Xavier et al. (2008) and Wilson (1990). Al- Rasadi et al. (2011) found that low HDL-C was associated with higher all-cause mortality and cardiogenic shock, compared with the satisfactory HDL-C group. The impact of low HDL-C on other in-hospital outcomes (re-infarction, re-ischaemia, congestive heart failure) was not significant. Faizal et al. (2009) studied 253 ACS patients and found that 41 patients were died with mortality rate of 16.21%.

Study limitation:

Sample size was relative small.

The study was conducted in a tertiary care hospital which does not represent the general population of the whole country.

Regression analysis was not done. So, outcome might be influenced by confounding variables.

The study was conducted in a single centre.

Conclusion:

The current study has showed that ACS patients with low HDL-cholesterol have poor in-hospital outcome than those with normal HDL-cholesterol level. Heart failure, arrhythmia, cardiogenic shock and duration of hospital stay were found to be significantly more prevalent in ACS patients with low HDL-cholesterol group. This study may provide the basis for large further studies aiming in-hospital outcome analysis in ACS patients with low and normal HDL-cholesterol levels. We hope that the current study will also help in making planning strategies for better management of ACS patients with low HDL-cholesterol level.

Conflict of Interest – None

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Original Article

Study of Gender-based In-Hospital Mortality Difference in Patients with Acute Myocardial Infarction

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Abstract:

Background: In-hospital mortality in female patients with acute myocardial infarction (AMI) and factors affecting this may be different from those of their male counterpart. The aim of the current study was to compare the in-hospital mortality between female and male patients with AMI and to compare the differences in age, risk factors, treatment given and complications between them.

Methods: Total 200 nonrandomised patients with a definite diagnosis of AMI admittedover a period of one year (January 2008 - December 2008) were enrolled in the study, in which 100 female patients were considered as cases and 100 male patients as controls. Both groups were studied prospectively.Datawere collected in prefixed questionnaire and data sheet and were analysed using SPSS software.

Results: mean age of the female patients was significantly higher than that of their male counterpart (57.0±10.1 years and 53.3±10.3 years respectively, p=0.029). Diabetes mellitus and hyperlipidemia were significantly higher in females than those in males (39% vs 24%, p=0.022 and 45% vs 32%, p=0.040 respectively), while smoking was staggeringly higher among the males (59%) compared to the females (4%) (p<0.001). However, no significant difference was observed between the groups in terms of hypertension (p=0.666).Pre-hospital delay (more than 12 hours after onset of chest pain) was significantly higher in the female group than that in the male group (72% vs 58%,p=0.038). Streptokinase was significantly underused in females (15.6%) compared to that used in males (32.2%) (p=0.011). The use of b-receptor blockerswas also significantly less in females than that in males (63% vs 75%, p=0.046).Death was significantly higher in the females (21%) than that in the males (10%) (p=0.032). Unstable angina, re-infarction and congestive heart failure were somewhat higher in the female subjects compared to their male counterparts (40% vs 34%, 2% vs 1% and 32% vs 23% respectively) though the differences did not seem significant (p=0.380, p=0.561 and p=0.154 respectively). Arrhythmias did not differ significantly between the groups (p^1>0.05).

Conclusion: Female patients with AMI had significantly higher in-hospital mortality. Early hospitalization and optimal treatment are crucial to decrease mortality in female patients.

Key words: Myocardial Infarction, Gender, Mortality.

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Introduction:

Coronary heart disease (CHD) and specifically AMI are the most common causes of death among both males and females throughout the world.Although AMI affects males in greater numbers, the short-term outcomes for females are worse. It is still a major problem that in-hospital case fatality and morbidity rates in the post-infarction period are higher for females[1].After AMI, a higher short-term mortality in females is documented[2].

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In Bangladesh, in a 3 month follow up study after AMI, mortality was 36.3% in females compared to 19.4% in males[3]. But factors influencing increased in-hospital and short-term mortality in females have not been studied in Bangladesh. Finding out the influencing factors of mortality is important for the development of appropriate measures to improve their clinical course and outcome. If these influencing factors could be managed earlier and properly, many female lives could be saved by taking effective measures and higher mortality rate in females would have been reduced.

Factors influencing increased in-hospital mortality in females observed in international studies may or may not be similar in our country. So, in the present study, In-hospital mortality rate between male and female patients with AMI was compared. In addition, factors influencing thegender-based in-hospital mortality differencewere assessed.

Aims and objectives:

General objective of this study was to compare the in-hospital mortality between male and female patients with AMI. Specific objectives were to identify the influencing factors of in-hospital mortality in patients with AMI, to compare these between male and female patients and their role in predictingender-based mortality difference.

Patients and methods:

This prospective observational study was done in the department of Cardiology, National Institute of Cardiovascular Diseases (NICVD), Dhaka, Bangladesh during the period from January 2008 – December 2008. Total 200 nonrandomisedpatients with a definite diagnosis of AMI were enrolled in the study, in which 100 female patients were considered as cases and 100 male patients as controls. AMI patients presenting first time in the hospital within 24 hours of symptom onset were included in this study. AMI patients admitted after 24 hours of symptom onset and those with associated prior myocardial infarction, prior percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG) were excluded from the study. AMI was diagnosed according to Universal definition criteria[4]:Detection of rise and or fall of cardiac biomarkers (preferably troponin) with at least one value above the 99th percentile of the upper reference limit (URL) together with evidence of myocardial ischemia with at least one of the following: 1)symptoms of ischemia 2)ECG changes indicative of new ischemia [new ST-T changes or new left bundle branch block (LBBB)] 3)development of pathological Q waves in the ECG 4) imaging evidence of new loss of viable myocardial or new regional wall motion abnormality. In our laboratory setting, cut off value of Troponin I was 0.49 nanogram per milliliter (ng/mL).

Patients were treated according to 'Acute coronary syndrome guideline for management (2004)',Bangladesh Cardiac Society, Dhaka, Bangladesh[5]. In eligible cases, reperfusion therapy was given with streptokinase in those presenting within 12 hours of onset of chest pain. Other medications were used as per recommendations in guideline. Cardiac failure and other complications were managed accordingly. Patient's cardiac failure was assessed clinically according to Killip classification[6] as follows:class (i) No heart failure: No signs of congestive heart failure, class(ii) Heart failure: S_3 gallop and bibasilar rales, class(iii) Severe heart failure: Frank pulmonary edema, class(iv) Cardiogenic shock: Hypotension (systolic pressure of 90 mm. Hg or less) and evidence of peripheral vasoconstriction such as oliguria, cyanosis and diaphoresis.

Data were analyzed using SPSS (Statistical Package for Social Sciences) version. The test statistics employed to analyze the data were unpaired t-test, chi-square test and Fisher's exact test. For each analytical test, $p<0.05$ was considered significant. Appropriate ethical implications were maintained.

Results:

Age distribution of the study population is shown in table I. Most of the patients were in 41-60 years age range in both groups (females 63% vs males 67%). Mean age was found 57.0±10.1 in females and 53.3±10.3 years in male (p=0.029).

Females and males were different in major risk factor profile which is shown in table II. Diabetes Mellitus(DM), Hypertension (HTN), smoking and Dyslipidemia were 39% vs 24%, 42% vs 39%, 4% vs 59%, and 45% vs 32% in females and males respectively. Differences were statistically significant in terms of DM, smoking and dyslipidemia ($p<0.05$) but not in HTN.

Prehospital delay was more in female patients than males (72% vs 58%, p=0.038) as shown in table III.

Streptokinase and beta blockers were also underused in females compared to males (15.6% vs32.2%, p=0.011 and 63% vs 75%, p=0.046 respectively) which are shown in tables IV and V.

Table VI shows that there was significant higher in-hospital mortality in females in comparison to males (21% vs 10%, p=0.032).

Table VII shows complications which reveals that Congestive heart failure, Unstable angina and re-infarction were more in females than males though the differences are not significant statistically.

Table-I

Age distribution of the study population (N=200)

Age group in year	Group				p-value
	Female(n=100)		Male(N=100)		
	N	%	N	%	
31-40	6	6.0	14	14.0	
41-50	27	27.0	28	28.0	
51-60	36	36.0	39	39.0	
61-70	24	24.0	15	15.0	
>70	7	7.0	4	4.0	
Mean age±SD (years)	57.0±10.1		53.3±10.3		0.029*

Data were analyzed using unpaired t-test
* Significant at the level of p-value <0.05

Table-II

Distribution of the study population by risk factors (N=200)

Risk factors		Group				p-value
		Female(n=100)		Male(n=100)		
		No.	%	No.	%	
DM	Yes	39	39.0	24	24.0	0.022*
	No	61	61.0	76	76.0	
Hypertension	Yes	42	42.0	39	39.0	0.666^{NS}
	No	58	58.0	61	61.0	
Smoking	Yes	4	4.0	59	59.0	<0.001***
	No	96	96.0	41	41.0	
Hyperlipidemia	Yes	45	45.0	32	32.0	0.040*
	No	55	55.0	68	68.0	

Data were analyzed using Chi-square test
* Significant at the level of p-value <0.05
*** Significant at the level of p-value<0.001
NS- Not significant (p>0.05)

Table-III

Distribution of the study population (N=200) by pre-hospital delay.

Time between onset of chest pain and hospital arrival	Group				p-value
	Female(n=100)		Male(n=100)		
	no.	%	no.	%	
>12 hours	72	72.0	58	58.0	0.038*
<12 hours	28	28.0	42	42.0	

Date were analyzed using Chi-square test
*Significant at the level of p-value <0.05

Table-IV

Distribution of the study Subjects by the use of streptokinase (N=200). (Used only in STEMI patients).

Use of streptokinase	Group				p-value
	Female(n=88)		Male(n=90)		
	No.	%	No.	%	
Used	14	15.6	29	32.2	0.011*
Not used	74	84.1	61	67.8	

Data were analyzed using Chi-square test
* Significant at the level of p-value<0.05
STEMI-ST-segment-elevation myocardial infarction

Table-V

Comparison of use of â-blockers between males and females (N=200)

β-receptor blockers	Group				p-value
	Female(n=100)		Male(n=100)		
	No.	%	No.	%	
Used	63	63.0	75	75.0	0.046*
Not used	37	37.0	25	25.0	

Data were analysed using Chi-square test
* significant at the level of p-value<0.05

Table-VI

Comparison of in-hospital mortality between the groups in the study population (N=200)

Outcome variable	Group				p-value
	Female(n=100)		Male(N=100)		
	No.	%	No.	%	
Death	21	21.0	10	10.0	0.032*

Data were analysed using Chi-square test
* Significant at the level of p-Value<0.05

Table-VII

Distribution of study population by complications (N=200)

Variable	Group				p-value
	Female(n=100)		Male(n=100)		
	No.	%	No.	%	
Congestive heart failure#	32	32.0	23	23.0	0.154^{NS}
Unstable angina#	40	40.0	34	34.0	0.380^{NS}
Re-infarction¶	2	2.0	1	1.0	0.561^{NS}
Atrial fibrillation¶	1	1.0	1	1.0	0.951^{NS}
Supraventricular tachycardia¶	1	1.0	2	2.0	0.864^{NS}
Ventricular tachycardia¶	5	5.0	3	3.0	0.571^{NS}
Ventricular fibrillation¶	7	7.0	5	5.0	0.718^{NS}
Av block(High degree)#2^{nd} degree3^{rd} degree	12210	12.02.010.0	1046	10.04.06.0	0.811^{NS}

Data were analysed using Chi-square test
¶ Data were analysed with the help of Fisher's Exact Test
NS-Not significant(p>0.05)

Discussion:

Alfredssonet al[2] mentioned that females sustaining AMI have a higher mortality than males. In Bangladesh perspective, we tried to explore in-hospital mortality difference between female and male patients with AMI and also to assess factors influencing this gender difference.In the present study, mean age of females was significantly higher than that of their male counterpart (57.0±10.1 years and 53.3±10.3 years respectively, p=0.029). Momenuzzaman[7] found a similar age distribution with respect to sex. The higher age incidence of ischemic heart diseases in female patients explains the fact that reproductive hormones before menopause offers protection against ischemic heart diseases, which is markedly reduced at menopause due to hormonal imbalance rendering them more vulnerable to ischaemic heart diseases[8].Regarding risk factors,smoking was strikingly higher among males (59%) compared to the females (4%)(p<0.001). Similar smoking behaviour was observed in the studies conducted by others.[7,9,10] Diabetes mellitus was considerably higher in female patients (39%) than that in male patients (24%) which is consistent with Gottlieb et al[9] and Jiang et al[10]. Momenuzzaman[7] did not observe any

sex differential in terms of diabetes mellitus, while Hanratty et al[11] found a low prevalence of diabetes mellitus in both sexes (female 16%vs male 11%).Regarding hypertension, no significant difference was observed between the groups (female 42%, male 39%, p=0.666) bearing consistency with findings of Momenuzzma[7]. However, the findings differ from those reported by Gottlieb et al[9]and Jiang et al[10] who found a significantly higher prevalence of hypertension in females compared to males.Females had a higher incidence of hyperlipidemia as opposed to males (45% vs 32%, p=0.040). Similar results were also reported by others.[9,10,12]

Regarding treatment with reperfusion, in our series, we used Streptokinase for reperfusion therapy within 12 hours of symptom onset in cases of eligible STEMI patients. Streptokinase was significantly underused in females (15.6%) compared to males (32.2%) (p=0.011).Underuse of reperfusion therapy was also reported in other studies.[7,10,13]The underuse of reperfusion therapy in our female patients may be explained by higher frequency of prehospital delay (>12 hours) in females (72%) compared to their male counterpart (58%) (p=0.038). Nag et al[16] also explained delayed arrival as a cause of underuse of Streptokinase. Comparison of use ofâ-blockers showed it was underused in females (63%) compared to males (75%) which is statistically significant (p=0.046).This finding is consistent with previous reports.[9,10,12-15]The significant underuse of â-blockers in female patients in our study may be explained by the fact that more females had diabetes mellitus and congestive heart failure. International data support the fact that despite recommendations in favour of use of â-blockers, these are still underused in post-infarct patients, at the expense of many lives lost[17].

Primary endpoint of our study was in-hospital death and secondary endpoints were unstable angina pectoris (early post MI angina), re-infarction and congestive heart failure and arrhythmias. Our study results showed that despite all necessary treatments females had 21% in-hospital mortality compared to 10% in males. The difference is significant (p=0.032).Similar results were observed by Hossain et al[3] and others.[7,10] Several other studies[11,13,14]conducted around different parts of the world also reported higher in- hospital mortality in females than in males.Analysisof complications showed that in our series, Killip class III or more of cardiac failure was found in 14% females and 7% males. Our findings are in accordance with those found byjiang et al[10]andVaccarinoet al[14]. These findings correlate with increased mortality in females, as Killip class of cardiac failure I through IV predicts hospital mortality by 6%,17%, 38% and 81% respectively[6].

Study Limitation:

This study had several limitations. The followings deserve mention:

Firstly, the study sample was taken consecutively (non-randomly) which might have affected the outcome of study.

Secondly, the sample size was relatively small as needed to predict the gender difference in mortality in patients of AMI.

Thirdly,risk factor profile is lacking in data of positive family history ofischaemic heart disease (IHD). Ambiguous history andlack of relevant documentary papers led us to this limitation.

Finally, the study did not have the scope to include the information of the patients of AMI who died on the way to reaching hospital, which might have resulted in an underestimation of the mortality rates in patients with AMI.

Conclusion:

From the findings of the study and discussion thereof it could obviously be concluded that females are more likely to die of acute myocardial infarction than males with same disease. Females are generally older than their male counterpart, arrive later in hospital after symptom onset and have higher Killip class (e"III) of cardiac failure. The study also reveals that females have a higher prevalence of major risk factors for ischemic heart diseases except smoking. Streptokinase and â-blockers are less used in females than in males. Recognizing the mortality difference between females and males with acute myocardial infarction is of paramount clinical significance, for females need optimal treatment like males.

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Case Report

Cardiac Hydatid Cyst: First Ever Documented Case in Bangladesh

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Abstract:

Hydatid cystic disease results from infection with the larval or adult form of the Echinococcus

Granulosus(tapeworm). Cardiac involvement is seen in 0.5% to 2% of patients withhydatid disease and involvement of the right atrium(RA), main pulmonary artery(MPA) and right pulmonary artery(RPA) are very rare.In this case a 22-yr-old farmer woman from Raigong, Sirajgong, Bangladesh presented to the ShahidZiaur Rahman Medical College hospital, Bogra with the complaints of breathlessness for 10 months; haemoptysis and chest pain for last 3 months.CT scan of the chest showed cystic lesion on right hilar region with right sided pulmonary inflammatory lesion. CT guided FNAC revealed benign right bronchogenic cyst. Echocardiography showed right atrial(RA) thrombus. CT angiogram report showed complete occlusion of right pulmonary artery(RPA) with thrombus, main pulmonary artery(MPA) was partially occluded with thrombus &thrombus in right atrium(RA). Under cardiopulmonary bypass, a multiloculated mass was removed from RA and a cyst like structure removed from MPA and RPA. Histopathological report of the biopsy specimen revealed hydatid cyst and presence of EchinococcusAb confirmed the diagnosis of Hydatid disease.

Keywords: Hydatid Cyst, Cardiac, Bangladesh

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Introduction

Hydatid disease is a zoonotic parasitic infection caused mainly by *Echinococcus granulosus* & other subtypes. Dogs, cats & foxes are primary carriers of this parasite. Cattle, goat, sheep & human can be infected as intermediary carriers when eat unwashed or uncooked vegetables or swallows the eggs of parasite. Embryo of the parasite inserts into the circulation from intestine and can involve every organ[1,2,3].

This infection commonly involves liver through portal vein, but if embryos bypass liver, they reach the lungs via the inferior vena cava. They can also involve other organs like heart[2].

The frequency of cardiac involvement is less than 2%[4,5]. Intracardiactumours, congenital cysts and aneurysms are in differential diagnosis of this lesion[6,7]. Left ventricle is the most common site of cardiac involvement [1].But rarer in right side of the heart. Solitary cardiac cyst may remain

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asymptomatic for a long periods, or can be discovered after serious and even fatal conditions. Rupture remains the major life threating complication and may result in anaphylactic shock. Cardiac temponade ,systemic or pulmonary embolism , chest pain, valvular regurgitation, and in exceptional cases arrhythmias can reveal hydatid cysts.

The diagnosis of cardiac hydatid disease is based on the combination of clinical suspicion, serologic tests and cardiac imaging. Echocardiography is highly sensitive and specific tool for the diagnosis of hydatidcysts[8] and positive serological tests can help the diagnosis of this disease.

Here we introduce a rare 1st ever documented case of hydatid cyst with cardiac involvement in Bangladesh and discuss the important points about the disease.

Case presentation

Mrs. Basona, a 22-yr-old farmer, non diabetic& normotensive woman from Raigong, Sirajgong, Bangladesh was presented to the ShahidZiaur Rahman medical college hospital, Bogra with the complaints of progressive exertional dyspnea for 10 months, hemoptysis and chest pain for last 3 months.Her symptoms were deteriorated day by day.She had no history of pulmonary TB. She had history of taking oral contraceptive for 8 years. She had only one child of 8 months of age. Her family and social history were negative. She was referred to National Institute of Diseases of the Chest and Hospital (NIDCH) for better management. After complete evaluation in NIDCH she was diagnosed asas a case of Right bronchogenic cyst with thrombus in the Right Atrium (RA), Main Pulmonary Artery(MPA) and Right Pulmonary Artery(RPA).Main pulmonary artery & right pulmonary artery arepartially &totally occluded respectively by thrombi. Then she was referred to National Institute of Cardiovascular Diseases (NICVD) for better management.

On general examination, all the vital signs were within normal limits. On cardiac and respiratory system examination, only there was diminished breath sound in right side with no added sounds &murmur. Other systemic examination revealed no abnormality. In laboratory tests, Completehemogram, Serum Electrolytes, RBS, CRP were within normal limits. Chest X ray showed right hilar rounded dense opacity (fig.1). Electrocardiogram showed no ischaemic change and revealed sinus tachycardia.Echocardiography showed right atrial (RA) & IVC thrombus, moderate PAH (PASP- 47mm Hg) with good LV systolic function.

CT scan of the chest showed cystic lesion on right hilar region with right sided pulmonary inflammatory lesion.CT guided FNAC revealed benign right bronchogenic cyst. CT Pulmonary angiogram report showedthrombi in the Right Atrium (RA), Main Pulmonary Artery (MPA) and Right Pulmonary Artery (RPA)and oligemicright lung with consolidation in the hilar region of the right lung (Fig: 2,3,4). Main pulmonary artery & right pulmonary artery were partially & totally occluded respectively by thrombi. Ultrasonography of whole abdomen was normal.

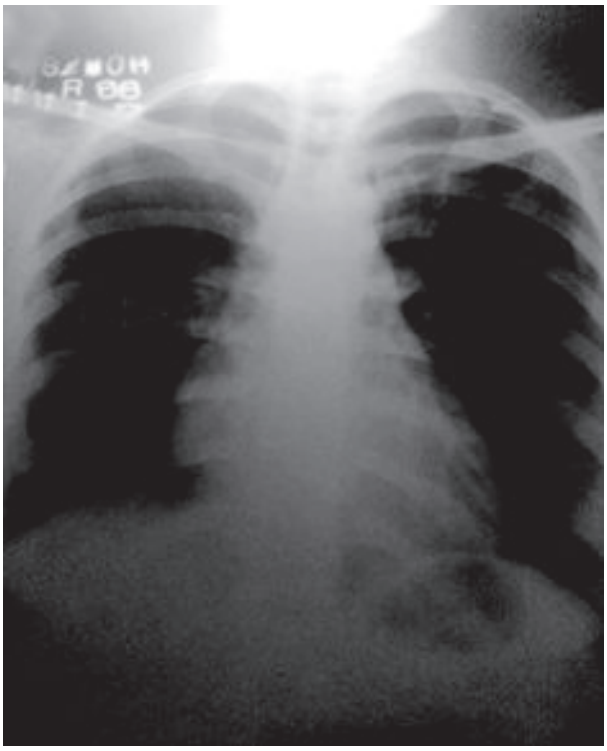

Fig.-1: *Chest X-ray before operation showing Right hilar mass (red arrow mark).*

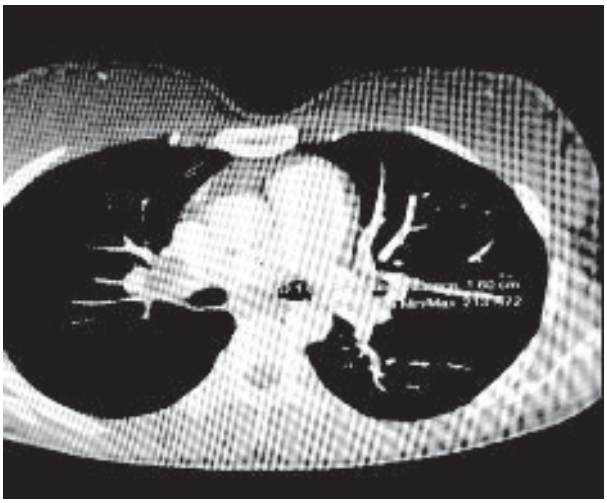

Fig.-2: *CT pulmonary Angiogram showing filling defect is seen in the right hilum with evidence ofcomplete occlution of RPA& partial occlusion of MPA.*

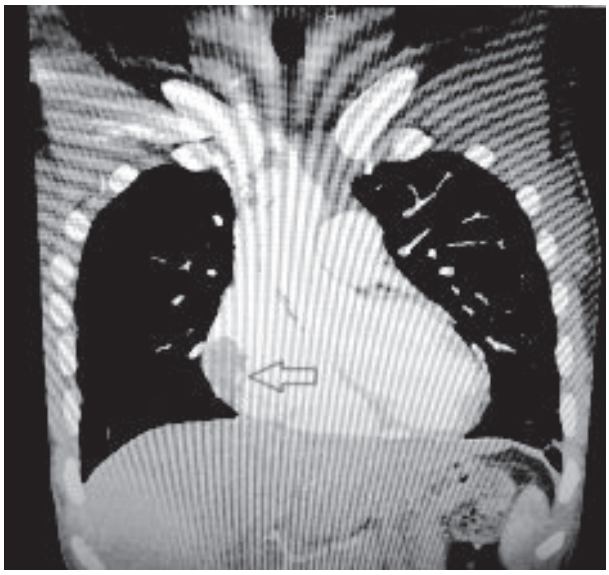

Fig.-3: *CT pulmonary Angiogram showing filling defect in contrast filled right atrium (Left arrow mark).*

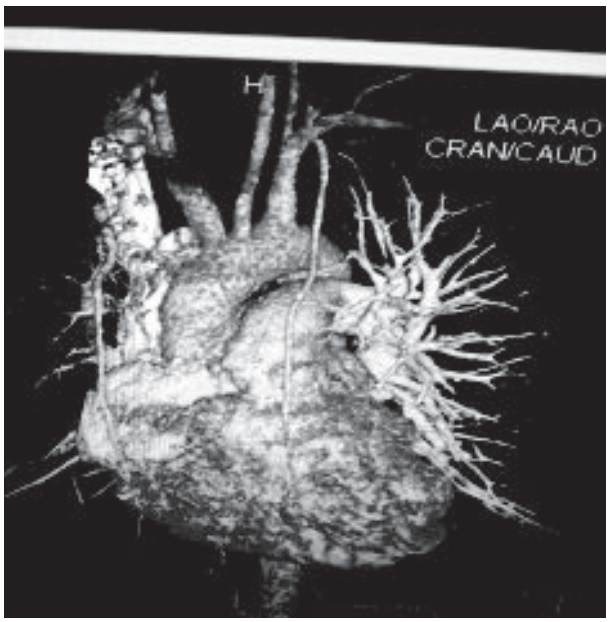

Fig.-4: *VRT (Volume Rendering Image) showing vascular tree of the heart and great vessels.*

The patient was operated on urgent basis. Under general anesthesia midline sternotomy was done.The operation was performed byestablishing Cardiopulmonary bypass (CPB) andarresting the heart with cold blood-edantigradecardioplegia. Per operatively, a mass was seen inthe right atrium and its right wall was found adherent to adjacent pericardium and mediastinal pleura. Then, right atriotomy was done. After opening the right atrium, a mass was found which looked like amultiloculated ruptured cyst.Then suspicion of hydatid cyst arouse. After that hypertonic saline soaked gauze & mops are used for prevention of spillage & anaphylactic shock. The mass invaded the pericardium & adjacent pleura. It was excised along with adjacentunhealthy atrial wall and adherent pericardium & pleura (Fig: 5).

Fig 5: *Operative photo clip showing excision of right atrial cystic mass. (Red Circle).*

The MPA was opened & a smooth surfaced massprotruding into it through the RPA was found. A considerable part of RPA between aorta & SVC was incised open. A smooth surfaced tubular structure was found to occupy whole of the RPA, the right end of which could not be negotiated. The structure was cut open & a clear fluid within it was sucked out. The structure was double layered with outer opaque thick layer & inner white thin layer. After further suction & manipulation, the cystic part of the structure extending into the right upper lobe branch of RPA along with MPA totally came out. Then the cystic mass occupying the hilar region of right lung disappeared. The specimen was collected in a kidney dish (Fig: 6). Excised right atrial wall was reconstructed with pericardial patch and different atriotomy wounds were repaired accordingly. Patient was weaned from CPB smoothly. The specimen wassent for histopathology and histopathological diagnosis was hydatid cyst. The diagnosis was confirmed by positive Echinococcus

Ab test in blood. The post-operative course was uneventful. Repeat chest X-ray was done on 10th postoperative day and no radiopaque shadow was found in the right hilar region (Fig: 7).The patient was discharged on 12thpostoperative day and prescribed with Albendazole for 3 months. The patient was also advised for periodic follow up.

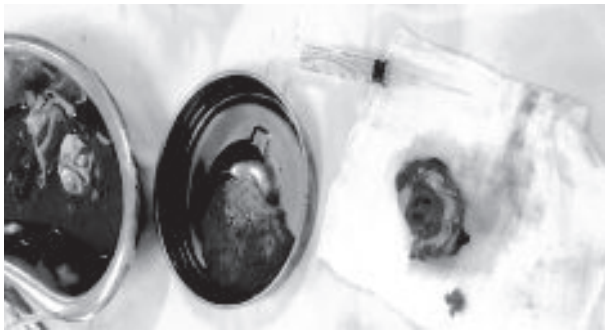

Fig.-6: *Excised tissue from RA, MPA & RPA.*

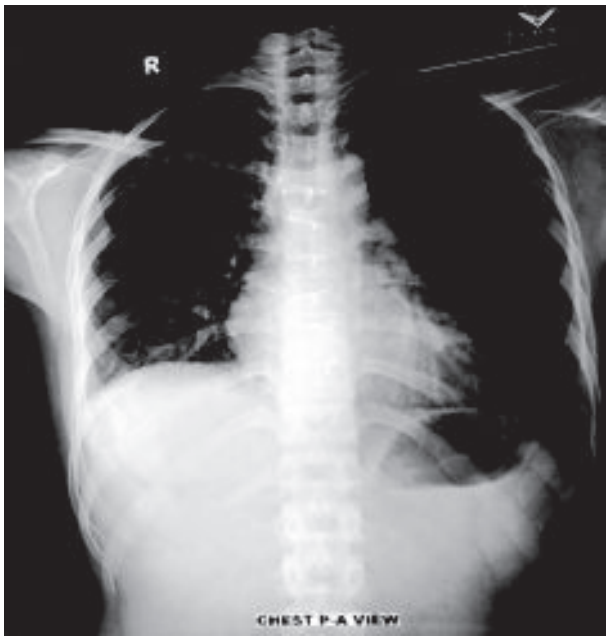

Fig.-7: *Normal chest X-ray after operation (Note: Hilar mass is absent after operation)*

Discussion

Echinococcosis was firstly described in the works of Hippocrates in the 4th century AD. The overall incidence ofEchinococcus infection is 0.4 per 100,000 persons. Humans are an accidental intermediary host. Its symptom depends on the size and site of infestation. Hydatid cysts are commonly found in the liver (50%–70% of cases), lungs(5%–30%), muscles (5%), bones (3%), kidneys (2%), spleen (1%) and brain (1%)[1,2]. Isolated cardiac involvement is rare and occurs in only 0.02-2% of cases[5].It is reported from nearly all geographic areas of Bangladesh but cardiac hydatidcysts are not yet reported.

The growth of hydatid cyst is usually slow and asymptomatic[3,6] and discovered coincidentally at postmortem or when an ultrasound or CT scan is done for some other condition[3] .Just about 10% of patients with cardiac hydatid cyst are symptomatic.[6].Involvement of the heart can occur from the sys4temic or pulmonary circulation or as a direct extension from adjacent structures. The coronary circulation is the main pathway by which the parasitic larvae reach the heart[7]. Because of arich coronary blood supply, the left ventricle is the site of cardiac hydatid cysts in 55% to 60% of cases. Less frequently involved are the right ventricle (10%–15%), pericardium (7%), pulmonary artery (6%–7%), left atrium (6%–8%), right atrium (3%–4%), and interventricular septum (4%)[1,8,9,10,11.] Initially, the cyst grows slowly between the cardiac fibers and causes no sign or symptom. Later it may cause pericardial pain, dyspnoea, invade the surrounding structure, obstruct the blood flow and also invade the conductive system of heart and cause cardiac arrhythmia or block[6,12]. Some cases can mimic acute coronary syndrome[13].Our case presented with the complaints of progressive exertional dyspnea, hemoptysis and chest pain.

In most of the cases, patient developed tachycardia or ventricular arryhmias[1,14].Our case presented with sinus tachycardia. Although the serologic reactions for hydatid cyst provide essential information, their sensitivity is not high and parameters frequently do not correspond to the morphological changes of the disease[14.]. Chest radiographs usually show a normal cardiothoracic ratio[14].

Echocardiography findings vary according to the sites of the cysts[8]. Echocardiography is the simple and useful diagnostic tool of cardiac hydatid cysts[8].Most of the cases reavealed as intra-myocardial tumour on Echocardiography[1,12].But our report reavealed as thrombus burden in the LA, MPA & RPA.

Computed tomography and MRI provide further information, such as the extent and anatomic relationships of the cysts[1,5].The presence of calcification in cystic lesion in echocardiography and MRI can be helpful to distinguish it from other cardiac cystic lesions[6,15]. Other helpful findings in MRI are presence of daughter cysts, and membrane detachment[1].

Cardiac surgery is the treatment of choice for most cases of cardiac hydatid cyst; however, the technique of surgery can be different[13,14]. The clinical presentation is usually insidious but there is always the lethal hazard of cyst perforation. Early diagnosis and an integrated treatment strategy are crucial. The results of surgical treatment of heart echinococcosis are better than the conservative strategy. Extraction of the cyst combined with chemotherapy in both peri andpost operative aiming to decrease the recurrences, consists the legeartis method of encountering this medical entity[14].Inoperable patients require long-term therapy with Albendazole. The most important major complication is the

rupture of the cyst, which can trigger an anaphylactic shock or tamponade, systemic or pulmonary embolization and compression of coronary branches[14].Scolicidal solutions such as iodine, ethanol, methylene blue or hypertonic saline can be used to reduce the risk of leakage of fluid from cyst during cardiac surgery[15].In our patient, despite previous ruptureof the hydatid cyst into the right atrium, there was no life-threatening complication such as anaphylactic reaction due to leakage of cystic fluid into the blood stream occurred.Albendazole therapy (400 mg twice daily) is typically prescribed for at least 4 days preoperatively and for 4 to 12 weeks postoperatively[10,14,15].

Conclusion

This is the 1st& only diagnosed and operated cardiac hydatid cyst case in Bangladesh. In this patient, Cardiac MRI was not done due to financial constrain.Early diagnosis and surgico-medical treatment is the mainstay of treatment for cardiac hydatid disease. In endemic areas, hydatid cyst should be considered in differential diagnosis of heterogeneous echogenic lesions on even if the serologic tests are negative.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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The authors declare that there is no conflict of interests.

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