Prevalence of Myocardial Infarction with Non-Obstructive Coronary Arteries in Western Nepal.

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Background and Aims: It is well known that ST segment elevation myocardial infarction results from complete occlusion of a coronary artery supplying that area. However, in up to 15% of patients with clinical diagnosis of myocardial infarction, early angiography reveal either non-obstructive or normal coronary artery. This subgroup of disease, myocardial infarction (MI) with non-obstructive coronary arteries (MINOCA), represent a diagnostic and therapeutic challenge to clinicians. We aimed to determine prevalence and clinical profile of patients with MINOCA in our study.

Methods: This is a retrospective, observational study conducted in cardiology department of Manipal Teaching Hospital, Pokhara, Nepal from 6th April 2014 to 5th April 2019. Patients with age ≥18 years and clinically diagnosed acute myocardial infarction who underwent coronary angiography without prior use of thrombolytic agents were selected. Data were analyzed using the software SPSS for windows version 18.

Results: A total of 177 patients underwent early coronary angiography without prior use of thrombolytic agent. The prevalence of MINOCA was 13.5% (n=24) in our study population. MINOCA patients were younger (p<0.001) compared to non-MINOCA. Smoking, systemic hypertension, access through femoral route and depressed left ventricular ejection fraction were significantly lower in MINOCA patients (p<0.05, for all).

Conclusion: The prevalence of MINOCA was high (13.5%) in our study. Prospective studies are needed to conclude its high prevalence and to look for other associated factors and etiology.

Keywords: Coronary Angiography; Myocardial infarction; Myocardial infarction with non-obstructive coronary artery disease.
Materials and Methods

A retrospective analysis of records of patients who were planned for primary angioplasty from 6th April 2014 to 5th April 2019 were done. A single centered, observational Study conducted at Manipal Teaching Hospital, a tertiary care Centre of Western Nepal with Cathlab facility. Data was collected in a pre-structured proforma and analyzed. The collected data were secured and made accessible only to investigator to maintain confidentiality.

All patients with clinical diagnosis of acute STEMI who were posted for primary angioplasty were included for study while patients who have undergone prior thrombolysis, old IHD, known Brugada syndrome, pericarditis and previous history of PCI or CAGB were excluded. MINOCA was diagnosed according to the current opinion paper of the ESC working group that focused on the clinical context of MINOCA. The diagnosis of MINOCA was based on: (1) clinical documentation of a myocardial infarction (2) the exclusion of obstructive CAD and (3) no overt cause for the acute MI presentation, such as cardiac trauma. Conventionally, obstructive CAD is defined as an epicardial artery stenosis ≥50 % on angiography, thus a stenosis <50 % is required for the diagnosis of MINOCA.\(^5\)\(^,\)\(^1\)\(^,\)\(^2\) The clinical diagnosis of an acute coronary syndrome was established according to the fourth universal definition of MI.\(^6\)\(^,\)\(^7\)

Seven cases who were not fulfilling the criteria were excluded and total of 177 cases were enrolled.

Data were analyzed using the software SPSS for windows version 18. We used mean and standard deviation (mean±SD) or median (25th–75th percentile) values for continuous variables while categorical variables were expressed as proportions (%). Chi-square test was applied to find association for nominal data. P value less than 0.05 was considered statistically significant.

Results

Among 566 cases of STEMI who have undergone coronary angiogram during study period, 177 patients were taken without prior use of thrombolytic agent and were selected for the study. The age ranged between 21 to 90 years with mean age of 59.72±13.45 years and 114 (64.4%) patients were male. The demographic and clinical characteristics of the study population shown in Table 1. Males predominated the study with male to female ratio of 1.8 in both the group. MINOCA patients were younger (mean age 46.17±11.74 years) compared to non-MINOCA patients (mean age 61.84±12.46 years) (p<0.001 for age group of <45 years). The prevalence of MINOCA was 13.5% (n=24). The exposure to traditional risk factors like diabetic mellitus (4.2% vs. 20.0%; P: 0.31) and dyslipidemia (12.5% vs. 28.1%; P: 0.10) were also lower in MINOCA group while history of flu (P: 0.08) which can be associated with viral myocarditis and alcohol (P: 0.80) intake were higher in MINOCA, though statistically insignificant. The mean left ventricular ejection fraction measured by significantly lower systolic and diastolic BP in non-MINOCA due to depressed left ventricular function (Table 2). Among 24 cases of MINOCA (fig:1), one young male patient had ECG change during second post-op day of acute appendicitis and was diagnosed type II MI, one middle aged lady had large coronary artery to left ventricular fistula, three patients with history of flu, had either clinical or ECG and echocardiographic evidence of myocarditis and another four had slow flow in coronary angiogram reflecting micro-vascular dysfunction. In remaining more than half (n=15) of the cases of MINOCA without specific etiology for ECG changes, no further investigation performed and were discharged with diagnosis of possible auto-thrombolysis.

| Characteristics | MINOCA (n = 24) | Non-MINOCA (n = 153) | P value |
|-----------------|-----------------|----------------------|---------|
| Age (in years)  |                 |                      |         |
| < 45 (n, %)     | 11 (45.8)       | 20 (13.1)            | <0.001  |
| >45 (n, %)      | 13 (54.2)       | 133 (91.1)           |         |
| Mean±SD         | 46.17±11.74     | 61.84±12.46          |         |
| Gender          |                 |                      |         |
| Female          | 9 (37.5%)       | 54 (35.3)            | 0.834   |
| Male            | 15 (62.5)       | 99 (64.7)            |         |
| Smoking         | 9 (37.5%)       | 91 (59.5)            | 0.043   |
| Alcohol n, (%)  | 11 (48.8)       | 66 (43.1)            | 0.804   |
| History of flu n, (%) | 2 (8.3) | 3 (2.0) | 0.080   |
| SBP (mmHg)      | 131.67±20.78    | 119.48±22.44         | 0.013   |
| DBP (mmHg)      | 85.00±17.45     | 82.75±13.35          | 0.009   |
| Hypertension n, (%) | 7 (29.2) | 78 (51.0) | 0.047   |
| Diabetes n, (%) | 1 (4.2)         | 20 (13.1)            | 0.316   |
| Dyslipidemia n, (%) | 3 (12.5) | 43 (28.1) | 0.105   |
| Atrial fibrillation n, (%) | 0 (0) | 11 (7.2) | 0.365   |
| Route           |                 |                      |         |
| Femoral n, (%)  | 4 (16.7)        | 99 (64.7)            | <0.001  |
| Radial n (%)    | 20 (83.3)       | 54 (35.3)            |         |
| Hemogloin (gm/dl) (mean±SD) | 12.46±1.14 | 12.02±1.77 | 0.250   |
| Random blood sugar (mg/dl) (mean±SD) | 120 (110–31.50) | 132 (110–54) | 0.325   |
| Median (25th -75th percentile) | 12.02±1.77 | 12.46±1.14 | 0.250   |
Table 2: Echocardiographic and electrocardiographic findings

| Characteristics | MINOCA (n = 24) | Non-MINOCA (n = 153) | P value |
|-----------------|-----------------|----------------------|---------|
| LV ejection fraction (%) | 54 ± 10.22 | 47.3±7.78 | 0.047 |
| ≥ 55 | 14 (58.3) | 28 (18.3) | <0.001 |
| 41–54 | 9 (37.5) | 95 (62.1) | |
| 30–40 | 0 (0) | 27 (17.6) | |
| < 30 | 1 (4.2) | 3 (2.0) | |
| Anterior wall involvement n, (%) | 18 (75) | 87 (56.8) | |
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