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Evaluation of the coronary angiography results in patients referred to Booali Sina Hospital, Qazvin, Iran

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Original Article

Abstract

BACKGROUND: Coronary artery disease (CAD) is one of the most common diseases of the present era, as it has the highest mortality rate in developed and developing countries. The correct choice of patients for angiography leads to a reduction in the cost of angiography and its possible consequences. The aim of this study was to evaluate the rate of normal coronary angiographies compared to all angiographies performed in Booali Sina Hospital in Qazvin, Iran, in 2018-2019.

METHODS: This descriptive-analytical cross-sectional study was performed by collecting and analyzing the results of coronary angiographies of all patients who underwent coronary angiography in Booali Sina Hospital in Qazvin from March 2018 to February 2019. The sampling method was census with a volume of 1564. After completing the checklist by extracting from patients' files, the data obtained from the study were analyzed using SPSS software.

RESULTS: Of 2566 performed angiography, 789 patients (30.7%) were normal or minimal in coronary artery and 1775 patients (69.3%) had significant CAD [single-vessel disease (SVD), two-vessel disease (2VD), and three-vessel disease (3VD)].

CONCLUSION: According to the results obtained in this center and comparison with other reputable centers, it seems that the selection of patients in this center has been done with good accuracy and the rate of normal coronary angiographies is within an acceptable range compared to all angiographies performed in this center.

KEYWORDS: Coronary Arteries; Coronary Disease; Angiography

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Introduction

Coronary angiography gives physicians both diagnostic and therapeutic opportunities because heart disease is the most common cause of death worldwide. Coronary angiography is a standard test for diagnosing patients with coronary artery disease (CAD). However, it is associated with a small risk of serious and vascular complications with estimates of < 1% and 2%-4%, respectively.[1,2] Angiography technique was first developed by Forssmann in 1929 and F. Mason Sones first used coronary angiography in 1963. Coronary angiography is defined as radiographic observation of the coronary arteries after radiopaque contrast media.[3]

Many patients undergoing angiography have normal coronary arteries; however, it is important to reduce this amount due to the

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invasive nature of angiography, its potential risk, and the significant costs of health care.

Despite efforts to optimize patient selection for cardiac catheterization depending on clinical history, biochemical test results, and stress testing, the coronary angiography ratio is 10% to 20% higher in women than in men. Normal angiography for cardiac catheterization in patients with chest pain is still an unknown finding and in women is five times more than men.[4]

Some cases of chest pain caused by ischemia may be due to abnormalities in the small blood vessels; other causes of chest pain and normal coronary angiography may be due to endothelial abnormalities with spasm.[5] Although acute myocardial infarction (MI) is generally associated with CAD, it has been reported to occur in patients with normal coronary angiography.[6] As the natural follow-up period of these patients shows, the proper treatment and management of patients with normal coronary arteries should not be neglected, as there is a significant risk in death and progression of heart disease.[7,8]

The difference in the incidence of normal angiography between different studies is due to differences between populations, climatic conditions, and the criteria used to determine the severity of coronary stenosis. Accordingly, the rate of normal angiography compared to the performed total coronary angiographies can be a criterion for assessing the quality of patients' choice in angiography centers.[9]

Sedghi et al. reported that more than one third of the patients did not have significant CAD and more than half of the patients had not performed non-invasive methods before angiography.[10] In study of Tohidniya et al., the results showed that 47.7% of the patients had a coronary artery involvement. In addition, a significant relationship was found between high blood pressure (P = 0.05) and education level (P = 0.02) with the number of affected vessels.[11]

To date, no study has been done on the amount of normal coronary angiographies compared to the total performed angiographies in the heart center of Booali Sina Hospital in Qazvin, Iran. Thus, we decided to evaluate the angiographies performed in this center during 1 year, to be informed about the coronary angiography results in Booali Sina Hospital in 2018-2019.

Methods

This descriptive-analytical cross-sectional study was performed to review and evaluate the available electronic records of all patients who underwent coronary angiography in Booali Sina Hospital, Qazvin, from March 2018 to February 2019.

The sampling method was census with the formula: which included all 1564 patients who were admitted to Booali Sina Hospital for coronary angiography. Information was obtained by studying and extracting the required variables from each patient's file and completing the form related to that patient. Patients whose angiographic sheet was illegible and incomplete were excluded from the study.

$$n = \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2 [P_1(1-P_1) + P_2(1-P_2)]}{(P_1 - P_2)^2}$$

The interpretation of coronary angiography is as follows:

- Normal epicardial coronary arteries (NECA)
- Minimal CAD
- Mild CAD
- Single-vessel disease (SVD)
- Two-vessel disease (2VD)
- Three-vessel disease (3VD)
- Coronary slow flow (10).

After completing the checklist with extracting from patients' files by cardiologist, the data obtained from the study were analyzed using SPSS software (version 18,

SPSS Inc., Chicago, IL, USA).

This research was approved by Ethical committee of Qazvin University of Medical Sciences (IR.QUMS.REC.1399.177). In addition, researchers were committed in respect to maintaining the confidentiality of personal information of patients during the study and dissemination of research results.

Results

This study was performed on 2564 patients who referred to the angiography center of Booali Sina Hospital in Qazvin and underwent coronary angiography.

Out of 2564 cases that performed coronary angiography in this center during 1 year, 463 cases (18%) were normal, 44 cases (1.7%) had minimal stenosis, 229 cases (8.9%) had mild stenosis, 53 cases (2%) had slow coronary flow, 671 cases (26.1%) had SVD, 467 cases (18.2%) had 2VD, and 637 cases (26.8%) had 3VD. Thus, angiography of 789 patients (30.7%) was normal or minimal in coronary artery and 1775 patients (69.3%) had significant CAD (Figure 1).

Based on the clinical status and cardiologists' decisions, 2564 cases performed coronary angiography (1500 men and 1064 women, with the mean age of 62.50 ± 13.90 years). There were no significant differences between the two studied groups in terms of age and sex (P = 0.40 and P = 0.62, respectively).

Discussion

The aim of this study was to evaluate the rate of normal coronary angiographies compared to all angiographies performed in Booali Sina Hospital in Qazvin, in 2018-2019.

According to the results obtained at Booali Sina Hospital, 18%, 1.7%, and 8.9% of patients were normal, minimal, and mild, respectively. In addition, findings showed that 2%, 26.1%, 18.2%, and 26.8% had slow coronary flow, SVD, 2VD, and 3VD, respectively, whereas Dianti et al. in a study on patients referred to the angiography center of Shahid Beheshti Hospital in Kashan, Iran, showed that 56.1% of patients had mild and non-pathological stenosis in their angiography.[13]

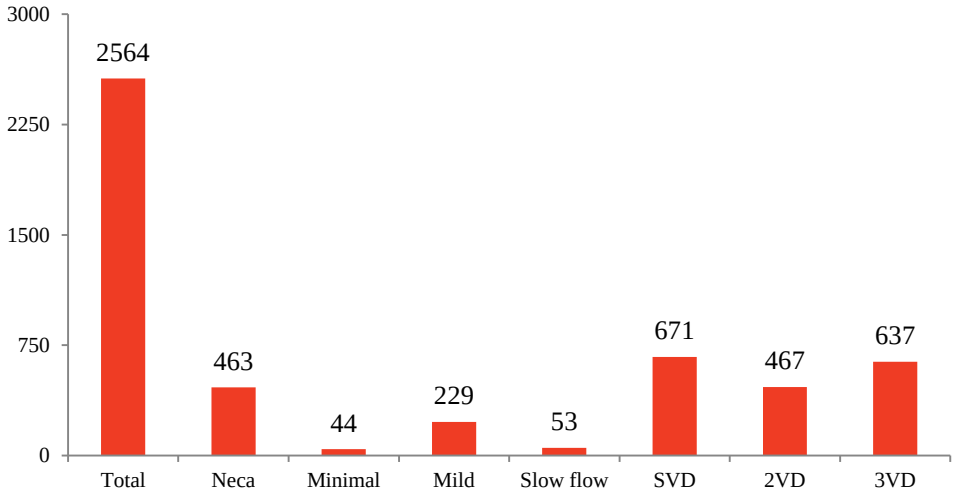

Figure 1. Results of angiographies performed in Booali Sina Hospital, Qazvin, Iran, in March 2018 to February 2019 [minimal (slight stenosis), mild (mild stenosis), slow flow (slow coronary flow)]

NECA: Normal epicardial coronary arteries; SVD: Single-vessel disease; 2VD: Two-vessel disease; 3VD: Three-vessel disease

Sedghi et al. in a study on patients referred to heart centers in Isfahan, Iran, during the three months of winter 2015, reported that 40% of patients had normal angiography or mild coronary stenosis.[10] Darijani in the surveying of normal response in angiography of patients with CAD admitted to selected hospitals in Yazd, Iran, showed that coronary angiography in 71% of patients was abnormal and in 28% of them was normal.[14] Mohebi et al. in the study of coronary angiography findings in patients with unstable angina referred to Imam Khomeini Hospital in Ardabil, Iran, from March 2017 to July 2017, showed that 23.4% of patients had normal coronary arteries.[15]

A study conducted by Asadi and Rahimi on patients of Tohid Medical Center in Sanandaj, Iran, showed that 45.5% of patients undergoing study had normal coronary angiography.[16] In a study conducted by Bidel et al. among 2046 cardiovascular patients who referred to angiography center in Ilam, Iran, during April 2010 to March 2012, 791 patients (38.6%) had normal coronary angiography.[17]

According to the findings, among the internal centers of the country, the angiography center of Booali Sina Hospital in Qazvin had a few normal coronary angiographies, which indicates that patients are well selected for coronary angiography in this center.

In studies performed outside Iran, the percentage of normal angiography reported in a number of articles was higher than the results of the present study. For example, in a study conducted by Levitt et al. on 8972 patients with coronary heart disease (CHD) in Ontario, Canada, the findings showed that 41.9% of patients had normal angiography.[18] Drabaa and Majed conducted a study to examine normal coronary arteries in 5000 adult patients who underwent coronary angiography for chest pain during 2006 to 2011, and they found that 17.3% of patients had normal coronary angiography.[9] In a three-year study by Ezhumalai and Jayaraman, out of 500 Indian women who underwent coronary angiography, 23.8% of patients had normal coronary angiography.[19] In 2013, out of 558 patients with chest pain who referred to the Westfriesgasthuis, a medium large secondary care center for angiography in Hoorn, the Netherlands, 151 patients (27%) showed normal or near-normal coronary arteries.[20] According to the studies, in comparison with the results of studies abroad, the rate of normal angiography in our center is in a very favorable condition compared to them.

The normality of angiography can be an indicator that angiography is appropriate to the patient's real needs. Given the costs that angiography imposes on the national health system, as well as the potential side effects that increase the cost and length of treatment, and on the other hand, the importance of doing it in the diagnosis of CAD, which leads to interventional treatment or cardiac bypass surgery, it is a good choice for patients.

Among the factors that may increase the rate of normal angiography in Booali Sina Medical Center are the following:

The used non-invasive tests, which are mainly exercise stress test and myocardial perfusion scan, have false positives; therefore, a number of cases selected for angiography are candidates for angiography based on positive non-invasive tests, which cannot be avoided. In addition, Booali Sina Center is the referral center of Qazvin Province and a number of patients from other active centers in the province and neighboring provinces are referred to this center and re-examining and performing non-invasive tests for these patients is with additional cost for the patient and the system.

Finally, it should be noted that although coronary angiography is a method for imaging the epicardial arteries of the heart, it does not show the function of the capillaries of the heart. Therefore, patients may have a capillary

dysfunction and ischemia disorder in the pre-angiographic studies, but in coronary angiography, there is no problem in the epicardial arteries, and in appearance, they have normal coronary angiography, but they actually have ischemia.

The frequency of risk factors for CAD, including hyperlipidemia, genetic tests, metabolic syndrome, obesity, etc., was not investigated in this research due to time and cost limitations. Therefore, future studies with a larger sample size and in a wider area of the society are suggested.

Conclusion

It seems that performing non-invasive tests in outpatients and obtaining a history and accurate physical examination before deciding on angiography can to some extent lead to better patient selection and reduce the rate of normal angiography, which can reduce the costs to the national health system and in line with the model can reduce the therapy costs to the national health system.

Conflict of Interests

Authors have no conflict of interests.

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