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Original Article

Myocardial bridging 'a double-edged sword': Analysis and significance

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1. Introduction

The right and left coronary arteries arise from the ascending aorta in its anterior and left posterior sinuses. Three major coronary arteries customarily sequel along the epicardial surface of heart. Occasionally, short moieties of coronary artery dip into the myocardium for a variable distance which is termed as myocardial bridging. This has a prevalence of 5% to 12% among patients and is usually confined to the left anterior descending (LAD).[1] Myocardial bridging has an idiosyncratic presentation on angiography. The bridged segment exhibits a normal calibre during diastole and precipitously constricts with each systole.[2]Analysis of the significance of myocardial bridging by coronary angiogram showed that even though tunnelling provides an atheroprotective locale, atherosclerosis will become an axiomatic phenomenon in a segment proximal to the bridged segment. Bridging alters the micro and macro coronary mechanics and also lure and inveigle atherosclerosis at the same time.[3] Studies regarding this aspect have not shown any consistent result as their sample size was small. This study will aid in providing reliable data to study this association. MB might have a far-reaching role in the safeguarding of distal segments of the bridged arteries from atherosclerosis rather than causing proximal atherosclerosis.[4]

The right coronary artery (RCA) is dominant in 80–85% of patients and nondominant in 7–13% of patients in which the left circumflex artery (LCx) is the dominant vessel. The remaining 2–5% patients have RCA that gives rise to the PDA (posterior descending artery), with LCx artery providing all the postero-lateral branches termed as balanced or codominant circulation.[5] Cardiac dominance patterns and their correlations with atherosclerotic prominence give a better understanding of its clinical significance. Though left dominant patterns appear to have significantly higher mortality rate; supporting evidence are lacking due to reduced sample size. In this context, the present study outlooks the incidence of right, left and co-dominance patterns in a broader aspect.

The study was aimed to find out the prevalence and significance of myocardial bridging among a west coastal population of Kerala and Karnataka. The objectives under study were to evaluate the segments involved in bridging and percentage of distribution of bridging in coronary arteries, to assess the morphology of bridged segments in patients with myocardial bridging among coronary arteries, to find the correlation of cardiac dominance pattern to bridging segments, to find the distribution of normal and tunnelled segments among diseased and non-diseased coronary arteries, to validate the quantitative data obtained as a protective mechanism against atherosclerosis or as a risk factor to cause coronary artery diseases.

2. Materials and methods

2.1. Study design

A cross-sectional study was conducted.

2.2. Study setting

After procuring the ethical clearance coronary angiogram reports of one thousand patients were studied prospectively for a period of 9 months. This study protocol conforms to the ethical guidelines as reflected in a priori approval by the institution's human research committee of the centre involved in the study.

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2.3. Study subjects

The age group of the study population was given a cut-off at 75 years due to marginal benefits marked during the follow-ups. Hence conservative approach is proven appropriate for the above mentioned age which itself indicates a poor prognosis with an average yearly mortality rate of 33%–35%.[6]

2.3.1. Inclusion criteria

All patients who had undergone through a percutaneous coronary angiographic procedure due to abnormalities in the normal cardiac parameters were selected for the study purpose after obtaining their Informed consent.

2.3.2. Exclusion criteria

Patients with previous history of a coronary artery bypass grafting (CABG) and recanalized normal looking coronary arteries with or without in-stent restenosis coronary arteries were excluded.

2.4. Sample size and its calculation

One thousand samples were estimated statistically for conducting the study.

The sample size was estimated by consulting a statistician and using the statistical software G* Power 3.0.10

2.5. Sampling technique

Convenience sampling was done. Patients will be approached at the cath lab prior to angiogram procedure.

3. Data collection

Calibration of the Quantitative Coronary Angiography (QCA) [7,8] systems was carried out by the method in which the coronary catheter is employed by automated edge detection technique resulting in corresponding calibration factors (mm/pixel). The vessel contour was detected by operator independent edge detection algorithms. The dimension of the coronary artery with a bridge was then measured as a function of the catheter diameter. The absolute diameter in mm was calculated by the computerized software analysis performed using the automated coronary analysis package of the Innova 2100 IQ Cath at a AW4.4 workstation. All angiograms were reviewed by two cardiologists using the double blinding method of randomisation for subsequent quantitative analysis. The vessels were assessed in an end diastolic frame for bridge length and diastolic measurements.

3.1. Measurement of a bridged segment

Bridging is usually confined to the left anterior descending (LAD) artery.[1] The bridged segment exhibits a normal calibre during diastole and precipitously constricts with each systole.[2] Right anterior oblique (RAO) cranial view displays the proximal, middle, distal segment of the LAD and allows separation of the diagonal branches superiorly and the septal branches inferiorly. The anteroposterior (AP) view requiring cranial (20 to 40 degrees) skew often projects the mid portion of the LAD, separating the vessel from its diagonal and septal branches. The RAO caudal projection is also used for visualization of the distal LAD and its apical termination.[5] In the case of bridges present in the left circumflex artery or right coronary artery, the appropriate views were selected accordingly to visualise a bridged segment (Fig. 1).

Bridged coronary arteries were documented for its location, diameter of the bridged segment in both systolic and diastolic phase. This is done to assess the percentage of narrowing in the artery during systole. The maximum diameter region will be taken for assessment in case of diastolic and a minimum diameter in the case of systolic calibration. The length of a bridged segment will be noted down as well as the whole length of the artery in which bridging is present will also be documented (Fig. 2). The percentage of bridging in the artery can be assessed using these parameters. Normal or diseased segment among bridging will be noted if present.

3.2. Coronary dominance patterns and assessment

The origin of the PDA and the posterolateral branches are best evaluated in the left anterior oblique (LAO) cranial or anteroposterior (AP) cranial view for right dominance.[5] If the left circumflex artery (LCx) is dominant, the optimal projection for the left

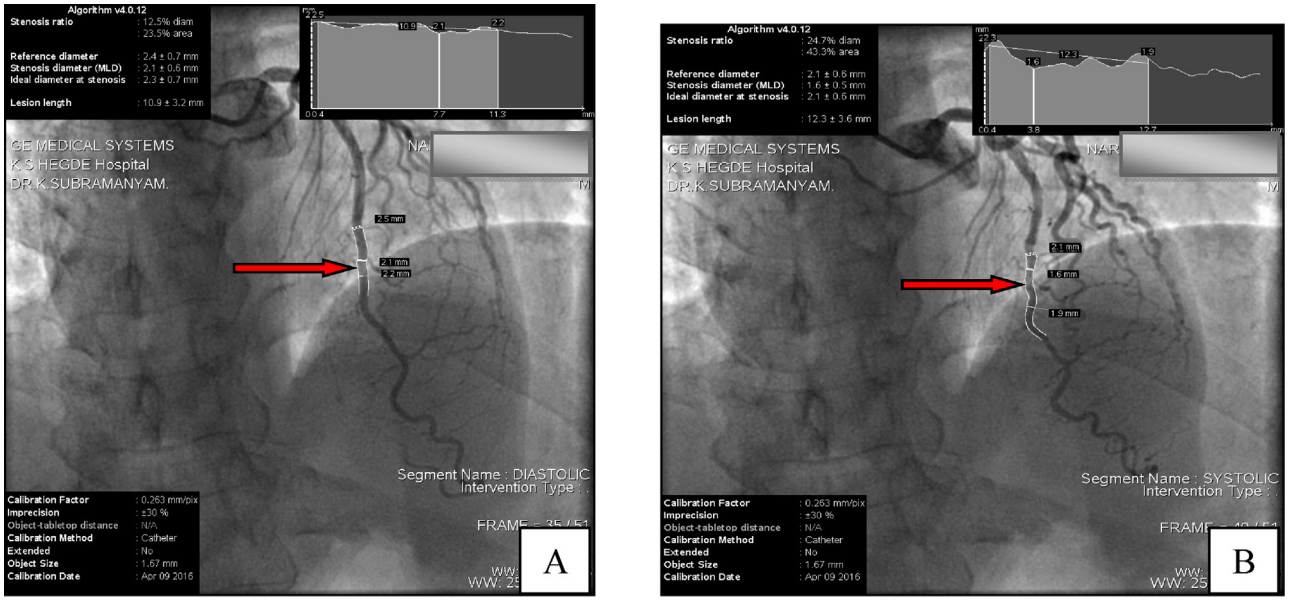

Fig. 1. Diastolic (A) and Systolic (B) phase of bridging.

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