The Role of Transoesophageal Echocardiography In Visualizing The Left Main And Proximal LAD And Circumflex Arteries

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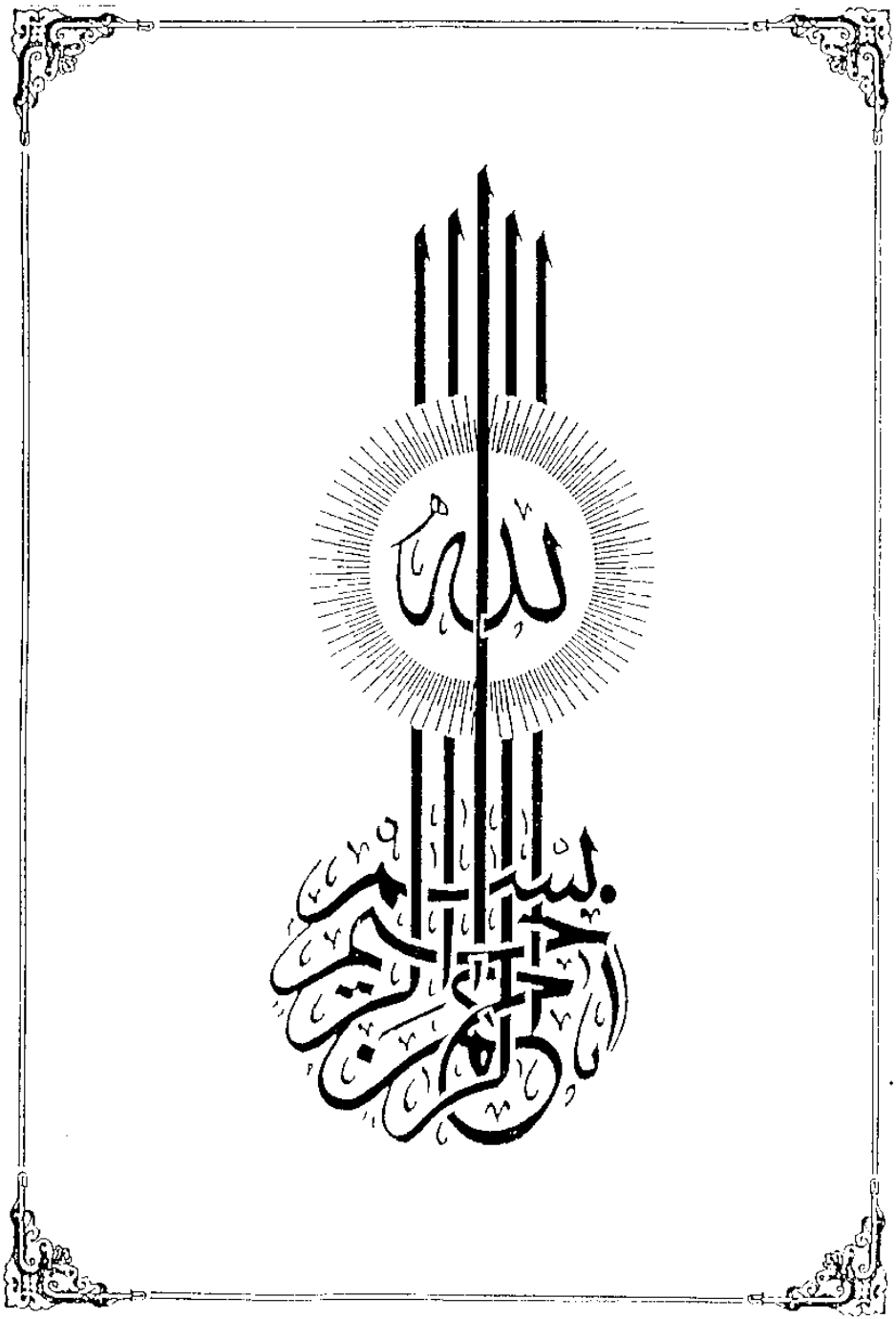

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Two-dimensional echocardiography provides a non-invasive mean of imaging cardiovascular anatomy and has been used to assess coronary artery lesion in several conditions. However, two-dimensional echo-cardiography is especially useful in the detection of coronary artery aneurysms.

Although transthoracic two-dimensional echocardiography can detect dilatation of the coronary arteries, the reliability of this technique in the detection of coronary artery stenosis is still doubtful.

Transoesophageal echocardiography, first used in 1976, images the heart from retrocardiac vantage, thereby, avoiding interference from interposed ribs, lungs and subcutaneous tissue. Without this interference between the transducer and the heart, transoesophageal two-dimensional images are generally of higher quality, this allows the use of higher frequency transducers allowing the non-invasive visualization of the proximal coronary anatomy. The left coronary artery system is imaged more frequently than the right.

Zwicky et al. in ***1988*** (2), found that the proximal left coronary artery system could be identified in up to 90% of patients, whereas, the right coronary artery was seen in less than 50%.

Yoshida et al. in ***1990*** (64) utilized the new biplane transoesophageal probe to simultaneously view both the long-axis and short-axis images, and were able to detect blood flow in the left main coronary artery in 57 (85%) of 67 patients, and show significant (more than 50%) narrowing of the coronary lumen in 10 (91%) of 11 patients. Multiple views each with slightly different transducer angulations are required to visualize a significant portion of the artery.

Aim of The Work

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This work aims at evaluating the adequacy of visualizing the left main coronary artery and the very proximal left anterior descending (LAD) and circumflex arteries with transoesophageal echocardiography. This may help in avoiding complications during coronary arteriography in patients with undetected left main disease.

Review Of Literature

Left Main Coronary Artery Disease

Introduction

The major role of the left main coronary artery (LMCA) is supplying blood to the left ventricular myocardium, the frequent involvement of this vessel in the atherosclerotic process, the high mortality rate associated with lesions in this area, and the increased angiographic risks associated with these lesions should make the noninvasive visualization of this structure and assessment of its patency of considerable importance (1).

Transthoracic echocardiography provides a non invasive mean of imaging cardiovascular anatomy and has been used to assess coronary artery lesion in several conditions. However, it is especially useful in detection of coronary artery aneurysm (2).

Recently the use of transesophageal echocardiography (TEE) in direct visualization and evaluation of the coronary arteries appears to be encouraging (3).

Anatomy of left main coronary artery.

The LMCA is a short trunk arising from the midportion of the left aortic sinus at its superior margin. The artery runs leftward, superiorly, and anteriorly from its ostium, through the aortic wall in the left

atrioventricular groove. The artery can be divided into 3 parts: the proximal or ostial region, the mid portion and the distal portion where branching occurs (4).

From necropsy studies (6), the left main trunk varies considerably in length, ranging from 2 to 40 mm with a mean of 13.5 mm. and a diameter of 5 -10 mm. It usually divides into two major trunks - the anterior descending and circumflex branches but frequently also gives rise to a third branch known as the intermediate branch. Occasionally, the left main has a fourth of even fifth branch (4).

In a study by ***Baroldi*** (5) involving 522 human hearts using an injection techniques, 66.4% of hearts examined had only 2 branches from the left main. In 31.2%, 3 branches were present, and in 2.4%, 4 branches were present.

Several normal variants of the left main stem have been described. The left main stem was absent in less than 1% of patients examined at necropsy by ***James*** (6), ***Baroldi*** (5) and ***Schresinger*** (7). In these cases, the anterior descending and circumflex branches arose form separate ostia.

Another normal variant (less than 1%) consists of origin of the circumflex from the right coronary artery (4). Thus in those individuals there is no clear - cut dividing line between the left main stem and the anterior descending branch.

In a small number (less than 1%), the ostium of the left main stem is located above the aortic sinotubular ridge usually referred to as a high take off of the left main stem (4).

Prevalence of Left Main Coronary Artery Stenosis

The incidence of left main coronary artery stenosis (LMCAS) observed by coronary angiographers and pathologists gives a hint as to its prevalence (4). Using ≥ 50% stenosis of the left main stem as the criterion for significant obstruction the frequency of LMCAS during coronary angiography has varied from 2.5% (23) to 13% (38).

Richard et al (4) have observed 27 cases in 399 patients (7%) undergoing coronary angiography.

The prevalence seems to be gradually increasing based on reports. This probably reflects the increased number of coronary angiographic procedures being performed on severely symptomatic unstable patients. (4).

Etiology of left main artery disease.

There are numerous causes of left main stem obstruction, but atherosclerosis is by far the most common etiology (4).

Involvement of specific portions of the left main coronary artery may offer an important clue as to some of the rarer causes of stenosis.

Table (1) Summarizes the known causes of left main stem obstruction. The various causes are divided into two groups according to the presence or absence of ostial involvement (4).

The ostium of the left coronary artery, located within the aortic wall, may become obstructed when the aortic root is involved as part of a systemic disease. Atherosclerotic plaquing of the ascending aorta can occasionally involve the ostium of the left main coronary artery. This is more likely in the small group of people who have a high take off of the left coronary artery (4).

Patients with type II hyperlipoproteinemia appear especially prone to left ostial obstruction (8).

Ostial narrowing due to atherosclerosis more commonly involves the right coronary ostium and has been seen more frequently in women (9).

Syphilitic aortitis is rarely seen now, but earlier reports (10) indicates that up to 20% of patients with syphilitic aortitis developed coronary ostial obstruction.

Since the development of cardiac valve replacement in the early 1960, 5 coronary ostial obstruction has occasionally developed after