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Original Research Paper

General Medicine

MYOCARDIAL PERFUSION IMAGING (MPI) IN CORONARY ARTERY DISEASE(CAD) PATIENTS

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ABSTRACT

Myocardial viability testing is used to find out whether the myocardium is viable or not, in patients with coronary artery disease or patients with severe LV dysfunction to know whether patient may or may not exhibit reversal of the myocardial dysfunction after revascularisation. Myocardial perfusion imaging (MPI) is a non-invasive imaging test which shows blood flow through heart muscle. It shows areas of the heart muscle which doesn't get sufficient blood supply. This test is often called as nuclear stress test. There are 2 techniques for MPI: single photon emission computed tomography (SPECT) and positron emission tomography (PET).

The aim of our study is to estimate the need to assess viable myocardial tissues in the myocardium.

Thus, helping to decide upon the options of management regarding considering medical treatment, interventional procedures like PTCA or surgical management like CABG.

SUMMARY: Of the 42 patients studied, 16 patients were advised for CABG (coronary artery bypass surgery), 7 patients were advised for PTCA and remaining patients were advised to continue medical management.

KEYWORDS : MYOCARDIUM, CORONARY ARTERY DISEASE, PERFUSION IMAGING, CABG.

INTRODUCTION

The first step of adaptation of myocardium to ischemia involves dedifferentiation which is known as "smart heart" hypothesis.(1)Following an infarction or ischemia to the myocardium, the myocardial tissue involved will usually demonstrate one of 5 pathophysiology which includes(2):

1) normal myocardial perfusion and function,
2) myocardial ischemia,
3) stunned myocardium,
4) myocardial hibernation, and
5) non-viable infarction.(3)

The first concept of what was today recognized to be "viable myocardium" appeared in the 1970s, when it was observed through various studies that ventricular dysfunction reverted after revascularization in some patients with history of acute myocardial infarction.(4) The concept of viability is different from that of necrosis, which implies an irreversible alteration in contractility.(5)

Myocardial stunning is a process in which the affected myocardial tissue following a transient ischemia due to decreased blood supply may result in reversible damage of myocardium without any necrosis.(6) This process is believed to play an important role in acute myocardial infarction patients following successful revascularisation.(7)

This process is clinically important in three settings:
1.after acute or evolved myocardial infarction
2. after complicated coronary interventions and
3.after cardiac surgery.(8)

By definition, hibernating myocardium is the resulting myocardial tissue which has been affected due to chronic ischemia thus leading to impaired contraction of left ventricle, which will improve following revascularisation.(9) Thus if the myocardium is found to be hibernating before revascularisation, it will predict the overall percentage of recovery of regional and global ventricular contraction after revascularisation.(10)

If blood supply to the myocardium is not restored within hours, irreversible myocardial necrosis can occur. (11) This irreversible damage to the myocardium is referred to as non-viable myocardium. The goal of viability testing is to determine the nonviable myocardial tissue, which in case if present may outweigh benefit of revascularization.(12-14)

The most important goal of viability testing is thereby to identify if there is significant viable myocardium present which would in turn likely result in an improved outcome with coronary revascularization. (15) If there is no significant viability, the risk of perioperative morbidity is higher than the outcome from revascularisation. (16,17)

MATERIALS AND METHODS

After obtaining clearance from IEC and consent from patients, study included 42 patients of age group 35-75 years admitted in Sree Mookambika Institute of Medical Sciences from July 2021 to September 2021.Inclusion Criteria included patients with ACS, CAD, severe LV dysfunction for whom myocardial viability testing was indicated. Exclusion criteria includes patients with cardiogenic shock, ICU patients and patients for whom MVT was not indicated. Relevant data ie. Myocardial perfusion imaging results were obtained. Descriptive and Analytical statistics was performed by SPSS version 16. A p value of less than 0.5 was considered significant.

REST- MYOCARDIAL PERFUSION SCINTIGRAPHY PROCEDURE:

12mCi of 99mTc MIBI was injected IV at rest. Delayed rest gated SPECT images were acquired later on using high resolution collimators on a siemens dual head gamma camera.

RESULTS

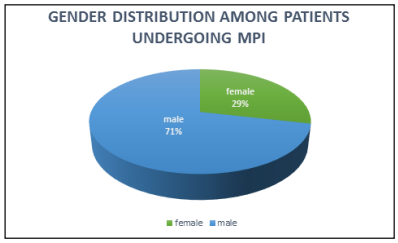

Figure 1: Gender Distribution In Patients Undergoing Mpi

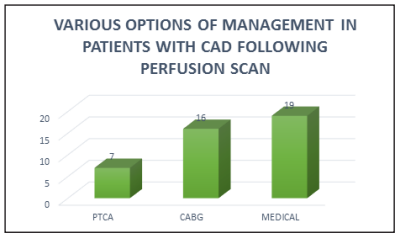

Figure 2: Various Options Of Management Following Mpi

Among 42 CAD patients undergoing perfusion study, mean age group was found to be 55 years. 71% of study population was males and 29% was females. Options of management varied. Percentage of patients who had undergone PTCA among the CAD patients studied are 16%. Those patients who had undergone CABG was found to be 38%. Remaining 45% patients was advised to follow up with medical treatment only, owing to concerns of viable myocardium after outweighing the risk Vs benefit ratio.

DISCUSSION

For detecting whether the myocardium is viable or not, investigations are essential. In our context based on the concern regarding affordability issues, it will be much better to opt for myocardial perfusion studies. Among the myocardial perfusion studies, the better option will be rest myocardial perfusion test because most of our patients have angina on exertion and are advised rest. Detection of the patients with viable myocardium through rest perfusion scanning helps in deciding the treatment options such as medical or revascularisation procedure. These would reduce further ischemia to the myocardium, thus reducing further damage to the myocardial tissues improving the myocardial or left ventricular contractility avoiding multi-organ dysfunction.

In our study, the male to female ratio was higher to undergo myocardial perfusion testing. Among them significant proportion was advised medical treatment due to the presence of nonviable myocardium or due to presence less than 20% percentage of viable myocardium. The rest of the patients has undergone revascularisation procedures based on the severity of the myocardium involvement and number of coronary arteries blocked by atherosclerosis leading to ischemia. Thus, rest myocardial perfusion imaging helps in deciding the options of management more accurately than compared to treating the patient without imaging.

CONCLUSION

The goal of viability testing was proposed to identify if there is significant viable myocardium present to result in an improved outcome following coronary revascularization. If there was no significant viability, the risk associated with perioperative morbidity is likely to be higher than the gain from revascularization.

Our study concluded that the proposed goal of viability test was true thus confirming that rest myocardial perfusion scans help in decision making regarding options of management in CAD patient, whether medical or revascularisation based on the viability of the myocardium studied thus aiding to a better outcome subsequently.

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