

Fractional Flow Reserve: Application in the Treatment of Acute Myocardial Infarction and Coronary Multivessel Pathology; A Progression to be Enacted

Muhammad Faisal Rajput¹, Aleena Arshad Ali², Muhammad Usamah Shakeel¹

¹Liaquat University of Medical and Health Sciences, Jamshoro, ²Jinnah Sindh Medical University, Karachi.

Fractional Flow Reserve (FFR) involves quantifying the proportion between the highest possible attainable circulation within a compromised coronary vessel and the hypothetical peak flow within a healthy coronary artery. A normative FFR value is commonly recognized as 1.0. Conversely, an FFR registering below the range of 0.75-0.80 typically indicates a correlation with myocardial ischemia, an ischemic condition potentially leading to myocardial infarction (MI).¹ Primary Percutaneous Coronary Intervention (PCI) is the suggested reperfusion treatment modality for subjects experiencing sudden onset MI.² Nevertheless, within Pakistan, there exists a notable occurrence of Major Adverse Cardiac Events (MACE) after PCI procedures, intensifying the burden of morbidity and mortality intricately tied to Myocardial Infarction.³

A study conducted at a leading cardiac institution in Karachi, Pakistan, identified a considerable segment of patients undergoing PCI who encountered short-term MACE. The study encompassed a cohort of 1150 patients, among whom follow-up was effectively conducted for 95.8% (1102 individuals), with an average follow-up duration of 6.1 months. Adverse cardiac events were documented in 19.1% of these patients, including a 14.2% incidence of total mortality, 5.4% of mortality due to cardiovascular causes, 0.7% of cerebrovascular accidents, 3.6% rehospitalization owing to cardiac insufficiency, and 6.1% due to MI necessitating intervention.³

Nonetheless, findings from recent studies, such as the Fractional Flow Reserve vs

Angiography-Guided Strategy for Management of Non-Infarction Related Artery Stenosis in Patients With Acute Myocardial Infarction (FRAME-AMI) Randomized controlled trial (RCT), (ClinicalTrials.gov Identifier: NCT02715518) demonstrate the cost-effectiveness of employing PCI using FFR for lesions involving non-infarct related vessels. This approach not only results in savings on medical expenses but also contributes to an enhanced standard of living in comparison to that of angiography-directed PCI in patients dealing with sudden onset MI and multiple vessel pathology.⁴ In this trial, the median follow-up duration was 3.5 years involving 562 subjects having an average age of 63.3 years, predominantly men (84.3%), found that FFR-directed PCI resulted in increased quality-adjusted life-years (QALYs) compared to angiography-directed PCI. The total accumulated expense per subject (which includes medical cost at index hospitalization, unit cost per service or product, medical cost at event, utility, transition probability, death, recurrent MI, repeat revascularization) for FFR-directed PCI was \$1208 (PKR 337756.80) less than angiography-directed PCI. The incremental cost-effectiveness ratio (ICER) was -\$19 484 (PKR -5447726.40), with an incremental net monetary benefit (INB) of \$3378 (PKR 944488.80), indicating the economic efficiency of FFR-directed PCI in MI and multiple vessel disease. Probabilistic sensitivity analysis revealed constant results, with a 97% chance of economic efficiency for FFR-directed PCI.

To conclude, given the financial constraints endemic to our healthcare system and the concurrent surge in cardiovascular events accompanied by less favorable prognoses, a compelling argument arises to extend the applicability of recent research findings to our local medical settings. Such an adaptation, if embraced, holds the promise of ushering in a normative transformation, steering the healthcare landscape

Corresponding Author:

Muhammad Faisal Rajput

Liaquat University of Medical and Health Sciences
Jamshoro.

Email: faisalrajput32@gmail.com

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towards more widespread incorporation of FFR-directed PCI, especially in the context of acute myocardial infarction cases. This strategic shift envisages a more economically sustainable therapeutic modality and an enhancement in the overall prognosis for patients grappling with cardiac challenges.

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