

Economic Evaluation of Different Treatment Modalities for Management of Patients with Multivessel Coronary Artery Disease (MV-CAD)

Summary

A Health Technology Assessment was conducted to establish the cost-effectiveness of the therapies looking at MV-CAD be used in the treatment of double and triple vessel diseases (DVD and TVD respectively). Conservative therapy of OMT should thus be the initial therapy to start treating patients. If the patient does require invasive therapy for one or the other reason, CABG should be the preferred therapy over PCI due to it being cost-effective as well as cost-saving over PCI.

Policy Recommendations

- To keep the conservative therapy regimen of OMT alone as the mainstay treatment with CABG being the preferred invasive therapy for cases showing unfavorable or worsening prognosis with OMT alone.
- PCI might be considered but owing to its higher costs attributable to the number of stents to be implanted, it is not recommended by this study (as the health gains are not that prominent as compared to CABG so as to justify investing in that higher cost).

The policy brief is based upon the Economic Evaluation of Different Treatment Modalities for Management of Patients with Multivessel Coronary Artery Disease (MV-CAD)

Background

MVD is often associated with a higher burden of comorbidities, left ventricular dysfunction, and cardiovascular risk. The goal in the management of MVD is to reduce angina and heart failure symptoms and a patient's subsequent risk of adverse cardiovascular events. Patients either undergo: Percutaneous Coronary Intervention (PCI) with Optimal Medical Therapy (OMT), Coronary Artery Bypass Graft (CABG) surgery with Optimal Medical Therapy (OMT) OR Optimal Medical Therapy (OMT) alone.

Studies conducted in western countries and have focused on eliciting the difference in clinical outcomes for patients with left main coronary artery disease with or without triple vessel disease. The existing data specifically looking at MV-CAD is quite low and what studies do exist are dated with no conclusive response to which strategy be used in the treatment of double and triple vessel diseases (DVD and TVD respectively).

In addition to that, very little

literature exists pertaining to the cost-effectiveness of the therapies. This is compounded by the scarcity of studies from the South-East Asian and specifically Indian subcontinent region for clinical outcomes of OMT alone versus PCI with OMT and CABG with OMT in MV-CAD treatment. Hence, the present study was undertaken to bridge a few of these existing gaps and lay the foundation for future economic evaluations and health technology assessments.

The Research Question in the present study was to find out that what is the most cost-effective treatment modality available for the management of patients with multivessel coronary artery disease (MV-CAD). The aim was to do the full economic evaluation to see which treatment modality among Invasive Procedures (i.e. percutaneous coronary interventions or PCI and coronary artery bypass graft or CABG surgery) and Conservative Therapy (i.e. Optimal

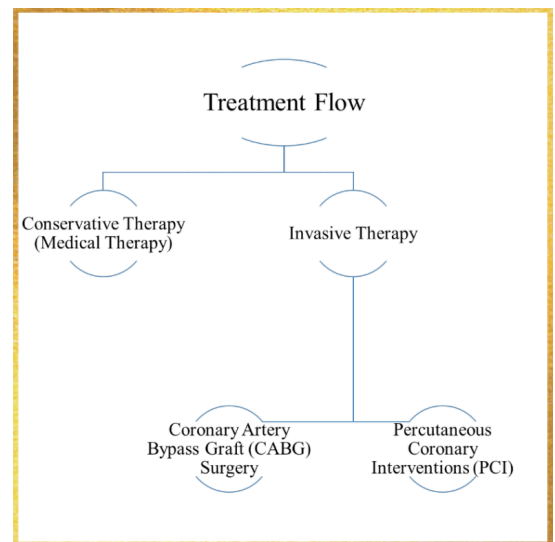


Figure 1: Treatment flow followed for patients with MV-CAD

Medical Therapy or OMT) is the better alternative for managing patients with MV-CAD and within invasive procedures which is the better alternative among PCI and CABG for the same.

Findings

As per the findings, when treating either MV-CAD, the between invasive and conservative (OMT) therapies, the invasive therapy is highly cost-ineffective with negative net health and monetary benefits. Regarding the patients that do undergo invasive therapy, CABG proves to dominate PCI with a positive net health benefit along with being cost-effective (Table I). The results of the subgroup analysis are illustrated below. Overall, invasive therapy does have a QALY gain over conservative OMT but when comparing amongst themselves, CABG had a better gain n QALYs for diabetics than non-diabetics (Table II).

Table I: Summary of results for MV-CAD patients

Category (MV-CAD patients)		BPPI Price of drugs			
		ICER (in INR)	ICER:GDP	NHB (in QALYs)	NMB (in INR)
Stage 1	<i>Invasive vs Conservative</i>	12,97,907.37	8.55	-0.698	-1,05,970.17
Stage 2	<i>CABG vs PCI</i>	-70,250.59	-0.46	0.906	1,37,464.71

ICER = Incremental Cost-Effectiveness Ratio, GDP = Gross Domestic Product (per capita per person), NHB = Net Health Benefit, NMB = Net Monetary Benefit, QALY = Quality Adjusted Life Year, INR = Indian National Rupee, BPPI = Bureau of Pharma Public Sector Undertakings of India, *CEA Threshold = GDP per capita per person of India (INR 1,51,793.69 as of May 31st, 2020 as per World Bank)

Table II: Summary of results for Diabetic MV-CAD patients

Category (Diabetic MV-CAD patients)		BPPI Price of drugs			
		ICER (in INR)	ICER:GDP	NHB (in QALYs)	NMB (in INR)
Stage 1	<i>Invasive vs Conservative</i>	7,77,458.76	5.12	-0.611	-92,730.82
Stage 2	<i>CABG vs PCI</i>	-34,856.08	-0.23	1.01	1,53,329.18

Major Findings

- Among invasive and conservative therapies for treating MV-CAD, invasive therapy was found to be **cost-ineffective** with negative net health and monetary benefits.
- MV-CAD patients that undergo invasive therapy, **CABG proves to dominate PCI** with a positive net health benefit along with being **cost-effective**.
- **CABG had a better gain n QALYs** for diabetics than non-diabetics.
- In the case of invasive vs conservative therapy, even at a really high willing-to-pay threshold of almost INR 60,00,000 invasive therapy can only have a 50% probability of being cost-effective.
- In case the patient does need to go for invasive therapy, CABG is the dominant therapy to choose from among the two (i.e. PCI and CABG). In diabetics, the trends seen were almost similar to those seen in the general population.

Conclusion

Invasive therapy is not a cost-effective strategy to start treatment of MV-CAD patients. Conservative therapy of OMT should thus be the initial therapy to start treating patients. If the patient does require invasive therapy for one or the other reason, CABG should be the preferred therapy over PCI due to it being cost-effective as well as cost saving over PCI. Based on this study, our recommendation would be to keep the conservative therapy regimen of OMT alone as the mainstay treatment with CABG being the preferred invasive therapy for cases showing unfavourable or worsening prognosis with OMT alone. PCI might be considered but owing to its higher costs attributable to the number of stents to be implanted, it is not recommended by this study (as the health gains are not that prominent as compared to CABG so as to justify investing in that higher cost). In the case of diabetics, our recommendation remains the same that the mainstay treatment be focussed around OMT alone and the patients be moved to CABG on the discretion of physician and the patient's response to OMT therapy.