

STANDARD TREATMENT WORKFLOW (STW)

SURGICAL MANAGEMENT OF CORONARY ARTERY DISEASE

Shiv Choudhary¹, Gautam Ganguli², Sai Chandran BV³, Dhiren Shah⁴, T Sunder⁵, Lokeshwar Rao Sajja⁶, Shantanu Pande⁷, Ambuj Roy⁸, Arun Kumar Yadav⁹

¹All India Institute of Medical Sciences Delhi; ²Armed Forces Medical College, Pune Maharashtra; ³Jawaharlal Institute of Postgraduate Medical Education and Research Pondicherry; ⁴Ahmedabad; ⁵Apollo Hospital, Chennai; ⁶Telangana; ⁷Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow; ⁸All India Institute Of Medical Sciences Delhi; ⁹Armed Forces Medical College, Pune Maharashtra

CORRESPONDING AUTHOR

Shiv Choudhary, All India Institute of Medical Sciences Delhi

Email: shivchoudhary@hotmail.com

CITATION

Choudhary S, Ganguli G, Chandran SBV, Shah D, Sunder T, Sajja LR, Pande S, Roy A, Yadav AK. SURGICAL MANAGEMENT OF CORONARY ARTERY DISEASE. Journal of the Epidemiology Foundation of India. 2024;2(2Suppl):S261-S262.

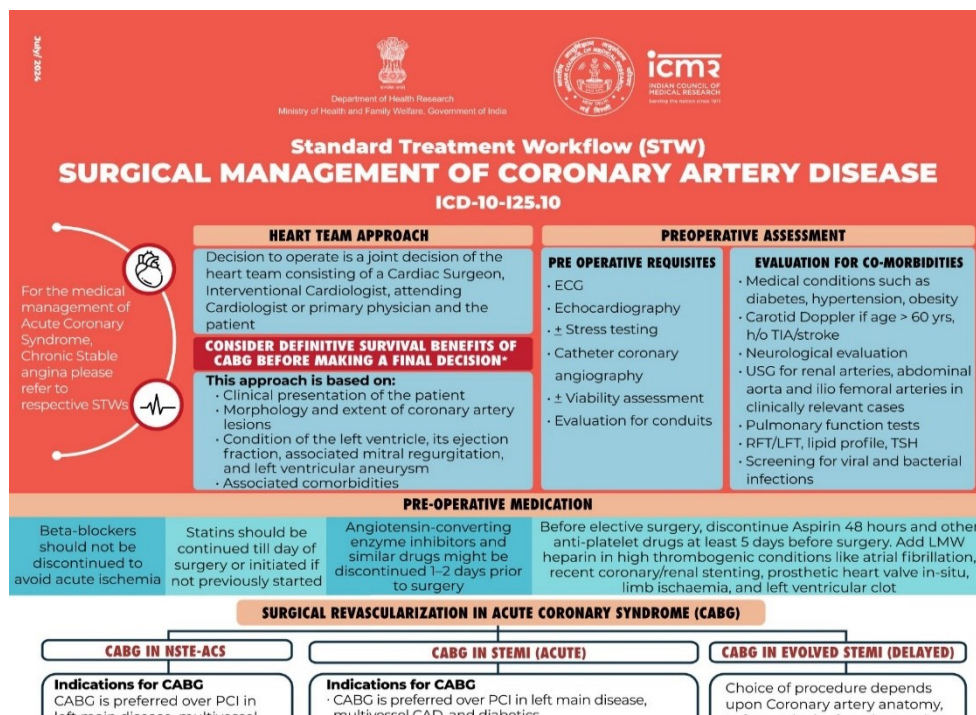
DOI: <https://doi.org/10.56450/JEFI.2024.v2i2Suppl.005>

This work is licensed under a Creative Commons Attribution 4.0 International License.

©The Author(s). 2024 Open Access

DISCLAIMER

This article/STW, was originally published by Indian Council of Medical Research (ICMR) under Standard Treatment Workflow. The reprinting of this article in Journal of the Epidemiology Foundation of India (JEFI) is done with the permission of ICMR. The content of this article is presented as it was published, with no modifications or alterations. The views and opinions expressed in the article are those of the authors and do not necessarily reflect the official policy or position of JEFI or its editorial board. This initiative of JEFI to reprint STW is to disseminate these workflows among Health Care Professionals for wider adoption and guiding path for Patient Care.



Standard Treatment Workflow (STW) SURGICAL MANAGEMENT OF CORONARY ARTERY DISEASE ICD-10-I25.10

For the medical management of Acute Coronary Syndrome, Chronic Stable angina please refer to respective STWs

HEART TEAM APPROACH	PREOPERATIVE ASSESSMENT				
<p>Decision to operate is a joint decision of the heart team consisting of a Cardiac Surgeon, Interventional Cardiologist, attending Cardiologist or primary physician and the patient</p> <p>CONSIDER DEFINITIVE SURVIVAL BENEFITS OF CABG BEFORE MAKING A FINAL DECISION*</p> <p>This approach is based on:</p> <ul style="list-style-type: none"> Clinical presentation of the patient Morphology and extent of coronary artery lesions Condition of the left ventricle, its ejection fraction, associated mitral regurgitation, and left ventricular aneurysm Associated comorbidities 	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">PRE OPERATIVE REQUISITES</th> <th style="width: 50%;">EVALUATION FOR CO-MORBIDITIES</th> </tr> </thead> <tbody> <tr> <td style="vertical-align: top;"> <ul style="list-style-type: none"> ECG Echocardiography ± Stress testing Catheter coronary angiography ± Viability assessment Evaluation for conduits </td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> Medical conditions such as diabetes, hypertension, obesity Carotid Doppler if age > 60 yrs, h/o TIA/stroke Neurological evaluation USG for renal arteries, abdominal aorta and ilio femoral arteries in clinically relevant cases Pulmonary function tests RFT/LFT, lipid profile, TSH Screening for viral and bacterial infections </td> </tr> </tbody> </table>	PRE OPERATIVE REQUISITES	EVALUATION FOR CO-MORBIDITIES	<ul style="list-style-type: none"> ECG Echocardiography ± Stress testing Catheter coronary angiography ± Viability assessment Evaluation for conduits 	<ul style="list-style-type: none"> Medical conditions such as diabetes, hypertension, obesity Carotid Doppler if age > 60 yrs, h/o TIA/stroke Neurological evaluation USG for renal arteries, abdominal aorta and ilio femoral arteries in clinically relevant cases Pulmonary function tests RFT/LFT, lipid profile, TSH Screening for viral and bacterial infections
PRE OPERATIVE REQUISITES	EVALUATION FOR CO-MORBIDITIES				
<ul style="list-style-type: none"> ECG Echocardiography ± Stress testing Catheter coronary angiography ± Viability assessment Evaluation for conduits 	<ul style="list-style-type: none"> Medical conditions such as diabetes, hypertension, obesity Carotid Doppler if age > 60 yrs, h/o TIA/stroke Neurological evaluation USG for renal arteries, abdominal aorta and ilio femoral arteries in clinically relevant cases Pulmonary function tests RFT/LFT, lipid profile, TSH Screening for viral and bacterial infections 				

PRE-OPERATIVE MEDICATION

Beta-blockers should not be discontinued to avoid acute ischemia	Statins should be continued till day of surgery or initiated if not previously started	Angiotensin-converting enzyme inhibitors and similar drugs might be discontinued 1-2 days prior to surgery	Before elective surgery, discontinue Aspirin 48 hours and other anti-platelet drugs at least 5 days before surgery. Add LMWH heparin in high thrombogenic conditions like atrial fibrillation, recent coronary/renal stenting, prosthetic heart valve in-situ, limb ischaemia, and left ventricular clot
--	--	--	--

SURGICAL REVASCULARIZATION IN ACUTE CORONARY SYNDROME (CABG)

CABG IN NSTEMI-ACS	CABG IN STEMI (ACUTE)	CABG IN EVOLVED STEMI (DELAYED)									
<p>Indications for CABG CABG is preferred over PCI in left main disease, multivessel CAD and diabetics</p> <p>Timing: After medical stabilization, and/or IABP support followed by early CABG</p>	<p>Indications for CABG CABG is preferred over PCI in left main disease, multivessel CAD, and diabetics</p> <ul style="list-style-type: none"> Mechanical complications (Emergency surgery) Coronary anatomy unsuitable for PCI/failed PCI <p>Timing: Preferably should wait for one week, until and unless there is hemodynamic instability refractory to medical management/ IABP, or if patient develops mechanical complications of MI</p>	<p>Choice of procedure depends upon Coronary artery anatomy, Left ventricular function, and myocardial viability</p>									
<p>TIMING OF CABG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Chronic stable angina</td> <td style="width: 33%;">Elective</td> <td style="width: 33%;"></td> </tr> <tr> <td>NSTEMI-ACS</td> <td>Performance of early CABG (< 48 hrs), even in higher-risk patients</td> <td></td> </tr> <tr> <td>STEMI</td> <td>In the absence of persistent pain or haemodynamic instability, surgery should be performed after 7 days</td> <td></td> </tr> </table>			Chronic stable angina	Elective		NSTEMI-ACS	Performance of early CABG (< 48 hrs), even in higher-risk patients		STEMI	In the absence of persistent pain or haemodynamic instability, surgery should be performed after 7 days	
Chronic stable angina	Elective										
NSTEMI-ACS	Performance of early CABG (< 48 hrs), even in higher-risk patients										
STEMI	In the absence of persistent pain or haemodynamic instability, surgery should be performed after 7 days										

REVASCULARIZATION IN CAD PATIENTS WITH HEART FAILURE

- CABG is preferred over PCI in patients with congestive heart failure
- Prior myocardial viability assessment is mandatory
- Surgical ventricular restoration is the procedure of choice in patients with left ventricular aneurysm and concomitant CABG with or without mitral valve repair

CORONARY ARTERY BYPASS GRAFTING

On-pump CABG (With Cardiopulmonary bypass)	Off-pump CABG (beating heart surgery without CPB)
<p>CONDUITS USED</p> <ul style="list-style-type: none"> LIMA to LAD is the standard of care and has proven survival benefit. If LIMA is unsuitable, RIMA should be used Additional conduits Saphenous vein RIMA Radial artery 	

DEFINITIVE SURVIVAL BENEFIT OF CABG* (in the following subsets)

- Left main stenosis greater than 50%
- Three vessel disease with diabetes/LV dysfunction
- Two vessel disease with critical proximal LAD disease
- Two vessel disease without proximal LAD disease (with severe ischemic burden)
- Single vessel disease with critical proximal/ostial LAD disease

LONG TERM POST-OP MANAGEMENT. GO WITH THE GUIDELINES GOAL (GWTG)

RISK REDUCTION/THERAPY	LONG-TERM GOAL	POSTOPERATIVE COMPLICATIONS		
Antiplatelet (unless contraindicated or not tolerated)	Single-antiplatelet - Aspirin 75 to 325mg/day, indefinitely	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> Bleeding Peri-operative MI Rhythm disorders Stroke Acute kidney injury Post-pericardiotomy syndrome Pericardial collection Pneumothorax </td> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> Sternal wound infection Conduit harvest site infection Urinary tract infection Pulmonary infection Septicaemia </td> </tr> </table>	<ul style="list-style-type: none"> Bleeding Peri-operative MI Rhythm disorders Stroke Acute kidney injury Post-pericardiotomy syndrome Pericardial collection Pneumothorax 	<ul style="list-style-type: none"> Sternal wound infection Conduit harvest site infection Urinary tract infection Pulmonary infection Septicaemia
<ul style="list-style-type: none"> Bleeding Peri-operative MI Rhythm disorders Stroke Acute kidney injury Post-pericardiotomy syndrome Pericardial collection Pneumothorax 	<ul style="list-style-type: none"> Sternal wound infection Conduit harvest site infection Urinary tract infection Pulmonary infection Septicaemia 			
Dual Antiplatelets (unless contraindicated or not tolerated)	Aspirin plus Clopidogrel/Ticagrelor (for one year for OPCAB patients, 6 months for on-pump CABG patients operated during acute coronary syndrome). Thereafter, single antiplatelet agent indefinitely			
Beta Blockers	Indefinitely for all patients			
ACE inhibitors/ARB/ARNI	Indefinitely for post-MI and CHF, diabetes, hypertension, chronic kidney disease, left ventricular systolic dysfunction, and peripheral vascular disease			
Lipid Level Reduction	Diet, Exercise, lipid-lowering agents (statins). Target low density lipoprotein < 70 mg/dl			
Diabetes	Hemoglobin A1c <7%			
Control of Hypertension	Blood pressure (mm Hg) < 140/85 for most patients, < 130/85 for CHF or renal failure, < 130/80 for diabetes			
Smoking	Complete cessation			
Physical Activity	30 min (5 times per week)			
Weight management	BMI between 18.5 and 24.9			

ABBREVIATIONS

<p>ACS: Acute Coronary Syndrome</p> <p>ARB: Angiotensin Receptor Blockers</p> <p>ARNI: Angiotensin Receptor Neprilysin Inhibitor</p> <p>BMI: Body Mass Index</p> <p>CABG: Coronary Artery Bypass Graft</p> <p>CAD: Coronary Artery Disease</p>	<p>CHF: Congestive Heart Failure</p> <p>CPB: Cardiopulmonary Bypass</p> <p>ECG: Electrocardiogram</p> <p>LAD: Left Anterior Descending Artery</p> <p>LIMA: Left Internal Mammmary Artery</p> <p>MI: Myocardial Infarction</p>	<p>OPCAB: Off-Pump Coronary Artery Bypass Surgery</p> <p>PCI: Percutaneous coronary intervention</p> <p>RIMA: Right Internal Mammmary Artery</p> <p>STEMI: ST Elevation Myocardial Infarction</p>
--	---	---

REFERENCES

1. Neumann FJ, Sousa-Uva M, Ahlsson A, Alfonso F, Banning AP, Benedetto U, Byrne RA, Collet JP, Falk V, Head SJ, Juni P, Kastrati A, Koller A, Kristensen SD, Niebauer J, Richter DJ, Seferovic PM, Sibbing D, Stefanini GG, Windecker S, Yadav R, Zembala MO; ESC Scientific Document Group. 2018 ESC/EACTS Guidelines on myocardial revascularization. Eur Heart J. 2019 Jan 7;40(2):87-165. doi:10.1093/eurheartj/ehy394. Erratum in: Eur Heart J. 2019 Oct 1;40(37):3096. doi:10.1093/eurheartj/ehz507. PMID: 30165437.

KEEP A HIGH THRESHOLD FOR INVASIVE PROCEDURES

This STW has been prepared by national experts of India with feasibility considerations for various levels of healthcare system in the country. These broad guidelines are advisory, and are based on expert opinions and available scientific evidence. There may be variations in the management of an individual patient based on his/her specific condition, as decided by the treating physician. There will be no indemnity for direct or indirect consequences. Kindly visit the website of ICMR for more information: (icmr.gov.in) for more information. ©Indian Council of Medical Research, Ministry of Health & Family Welfare, Government of India.