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CURRENT CONCEPTS IN DIAGNOSIS AND MANGEMENT OF ACUTE CORONARY SYNDROMES

An Essay Submitted For Partial Fulfillment of Master Degree in Intensive care

 $\mathbf{B}\mathbf{y}$

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LIST OF ABBREVIATIONS

Abbreviation	Meaning			
ACC	American College of Cardiology			
ACE	Angiotensin-converting enzyme			
ACS	Acute coronary syndrome			
ACT	Activated clotting time			
ADP	Adenosine diphosphate			
AF	Atrial Fibirilation			
AHA	American Heart Association			
aPTT	Activated partial thromboplastin time			
AMI	Acute Myocardial Infarction			
ARB	Angiotensin receptor blocker			
ASA	Acetyle Salysilic Acid			
AV	Atrioventricular			
BMS	Bear Metal Stent			
BNP	Brain natriuretic peptide			
CABG	Coronary bypass graft surgery			
CCBs	Calcium Channel Blockers			
CHD	Coronary heart disease			
CHF	congestive heart failure			
CK	Creatinine kinase			
CKD	Chronic Kidney Disease			
CK-MB	Creatinine kinase myocardial band			
CMR	Cardiac Magnetic Resonance			
COX	Cyclo-oxygenase			
CPR	Cardio pulmonary ressussitation			
CRF	Chronic renal failure			
CRP	C-reactive protein			
CrCl	Creatinine clearance			
CRT	cardiac resynchronization therapy			
CT	Computed tomography			
CS	Coronary sinus			
cTnT	Cardiac troponin T			
cTnI	cardiac troponin I			
CX	Circumflex			
D	Diagonal branch			
DAPT	Dual antiplatelet therapy			
DES	Drug-eluting stent			
Dl	decilitre			
DPTI	Diastolic pressuer time index			
DTI	Direct thrombin inhibitor			
ED	Emergency depa			
e.g.	for example			
EČG	Electrocardiogram			

EF Ejection fraction

EMS Emergency medical service

EVR Endo cardial viability ratiogddwv`c`2a`

Factor- Xa Activated factor-X

FDA Food Drug Administration FFR Fractional flow reserve FMC First medical contact

GCSF Granulocyte -macrophage colony stimulating factor

GCV Great cardiac vein

GFR Glomerular filtration rate

GPIIb/IIIa

inhibitors Glypoprotein IIb/IIIa inhibitors

GRACE Global registery of acute coronary event HDLc High-density lipoprotein cholesterol

HF Heart faliuer

HIT Heparin-induced thrombocytopenia HMG COA Hydroxy methyl glutaryl co enzyme A HsCRP High-sensitive c-reactive protein

IABP Intra aortic ballon pump

ICD implantable cardioverter defibrillator

ICH Intra cranial haemorrhage

i.e. that is

INR Intrnational normalization ratio

IU International units

IV Intravenous Kg Kilogram

LAD Left anterior decesending
LBBB Left-bundle branch block
LCA Left coronary artery

LDLc Low-density lipoprotein cholesterol LMWH Low molecular weight heparin

LV Left ventricular

LVF Left ventricular function MACE Major adverse cardiac events

MBF Myocardial biood flow MCV Middel cardiac vein

mg milligram

MI Myocardial infarction

mL millilitre mm millimeter

MMPs Matrix metallo proteinases

NO Nitric oxide

NOS Nitric oxide synthase

NSAID Non-steroidal anti-inflammatory drug NSTEMI Non-ST elevation myocardial infarction

NTG Nitroglycerin

NT-proBNP N-terminal pro-hormone brain natriuretic peptide

PCI Percutaneous coronary intervention

PDA Posterior descending artery

PED Phospho di esterase

PET Positron Emission tomography

RCA Right coronary artery

RV Right ventricle

SA Sinuatrial ST Stress test

STEMI ST-elevation myocardial infarction

TIA Transite ischemic attacks

TIMI Thrombolysis in myocardial infarction

TNF Tumor necrosis factor
TTI Tention time index
UA Unstable Angina
UEH Unfractionated happin

UFH Unfractionated heparin

VCAM1 Vascular cell adhesion molecule 1

VT Ventricular tachycardia VWF Von willbrand factor

Introduction

Acute coronary syndrome (ACS) describes the spectrum of clinical manifestations which follow disruption of a coronary arterial plaque, complicated by thrombosis, embolization and varying degrees of obstruction to myocardial perfusion. The clinical features depend upon extent and severity of myocardial ischemia. Complete coronary occlusion in the absence of collateral perfusion results in ST-segment elevation myocardial infarction (STEMI) or non ST-segment elevation myocardial infarction(NSTEMI). The release of sensitive markers of myocardial necrosis (e.g. troponins) is regarded as indicative of myocardial cell necrosis and fulfills the definition of myocardial infarction. If no rise in markers is detected, the term unstable angina (UA) is used and non-cardiac differential diagnosis must be considered (Hammet al, 2001).

Advances in our understanding of atherogenesis processes that lead to plaque rupture and the pathophysiologic hallmark of ACS allow for more precise identification, risk stratification and treatment in the future(Faxonetal, 2004).

Although timely and appropriate treatment reduces the risk of immediate or subsequent poor outcome, the high prevalence of risk factors for coronary Heart disease (CHD) ensures that the prevalence of future ACS will also be high. Multiple risk factors may play important role in the process of the ACS include smoking, hypertension, diabetes mellitus, dyslipideamia, metabolic syndrome and obesity.

Unfortunately, the prevalence of risk factors is stratified by economics, educational level and cultural differences, among other factors, which

puts patients who may be least likely or the least able to seek skilled care at the most risk for poor outcomes (Jeffery et al, 2007).

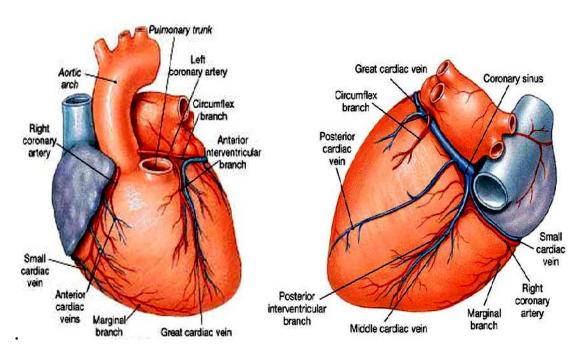
Prompt diagnosis and treatment offer the greatest potential benefits for the myocardial salvage in the first hours of STEMI and early focused management of UA and NSTEMI reduces adverse events and improve outcome. Thus, it is important that healthcare providers recognize patients with potential ACS in order to initiate the evaluation and appropriate management as early as possible. In the case of STEMI, this recognition also allows prompt notification of the receiving hospital and preparation foremergent reperfusion therapy(Steget al, 2003)

Prognosis in ACS is based on the extent of coronary disease and left ventricular (LV) function, overlaid with the short term risk associated with the culprit lesion and the unstable state. The short term risk is related almost entirely to myocardial infarction (MI) and its complications and to the recurrences of unstable angina. Risk is highest in the hours, days and first month after the onset of symptoms. (Bounhoureet al, 2004)

Applied anatomy and physiology of coronary circulation

Coronary circulation is the circulation of blood in the blood vessels of the heart muscle (the myocardium). The vessels that deliver oxygen-rich blood to the myocardium are known as coronary arteries (fig 1). The vessels that remove the deoxygenated blood from the heart muscle are known as cardiac veins (Fusteret al, 2001).

An overview of the coronary arteries:



(A) Anterior View

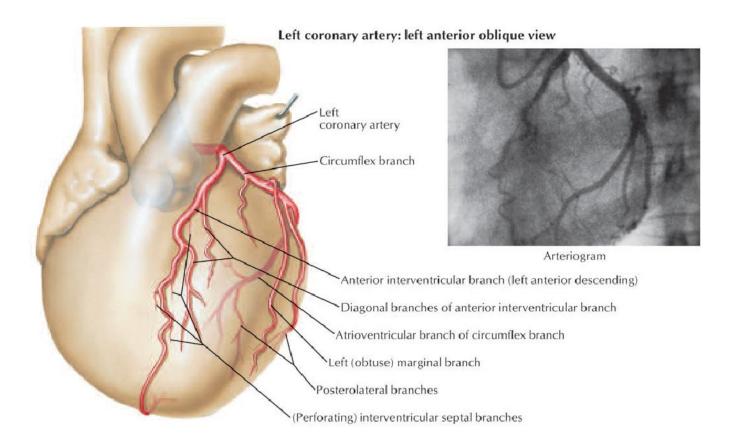
(B) Posterior View

Fig 1;An anterior and posterior views for coronary arteries

(Susan, 2004)

- Left Main or left coronary artery (LCA)
 - Left anterior descending (LAD)
 - diagonal branches (D1, D2)
 - septal branches
 - Circumflex (CX)
 - Marginal branches (M1,M2)
 - Right coronary artery
 - Acute marginal branch (AM)
 - AV node branch
 - Posterior descending artery (PDA)

LCA



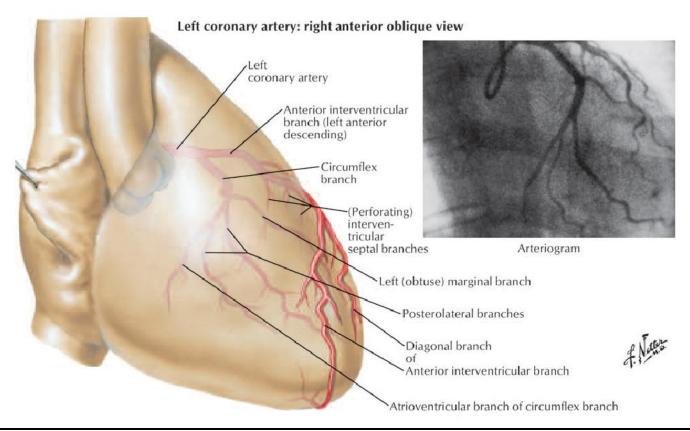


FIGURE 2. Diagram showing the left coronary artery.(David,2007)

The left coronary artery (LCA) is also known as the left main (fig 2).

The LCA arises from the left coronary cusp.

The aortic valve has three leaflets, each having a cusp or cusp-like configuration.

These are known as the left coronary cusp (L), the right coronary cusp (R) and the posterior non-coronary cusp (N).

Just above the aortic valves there are anatomic dilations of the ascending aorta, also known as the sinus of Valsalva. The left aortic sinus gives rise to the left coronary artery, and the right aortic sinus which lies anteriorly, gives rise to the right coronary artery. The LCA travels between the right ventricle outflow tract anteriorly and the left atrium posteriorly and divides into LAD and CX(Robinet al, 2008).

LAD

The LAD travels in the anterior interventricular groove and continues up to the apex of the heart. The LAD supplies the anterior part of the septum with septal branches and the anterior wall of the left ventricle with diagonal branches.

The LAD supplies most of the left ventricle and also the AV-bundle.

CX

The CX lies in the left AV groove between the left atrium and left ventricle and supplies the vessels of the lateral wall of the left ventricle. These vessels are known as obtuse marginals (M1, M2...), because they supply the lateral margin of the left ventricle and branch off with an obtuse angle. In most cases the CX ends as an obtuse marginal branch, but 10% of patients have a left dominant circulation in which the CX also supplies the PDA.

In 15% of cases a third branch arises in between the LAD and the CX, known as the ramus intermedius or intermediate branch. This intermediate branch behaves as a diagonal branch of the CX(Robin et al, 2008).