Isfahan Cardiovascular Research Institute

THE NAMES OF
GOD

WHO Collaborating Center

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Paraclinic tests in AMI

ICH ECG

Echocardiography

- The echocardiography has become an established and standard tool in the evaluation and management of the patients with acute myocardial infraction
- Role : Diagnosis , location , extent of MI , ventricular function , prognostic information , mechanical complications and risk stratification

INDICATIONS FOR ECHOCARDIOGRAPHY IN MI

- Echocardiography is indicated to aid diagnosis in selected patients with suspected MI and is indicated in all patients with confirmed acute MI to evaluate regional and segmental ventricular function which influences therapy, to evaluate for mechanical complications and intraventricular thrombosis, and to provide prognostic information.

- In addition, stress echocardiography is one of the recommended methods for identifying residual ischemia post MI.

DIAGNOSIS OF MI Use of echocardiography

- Echocardiography is an accurate noninvasive test that enables detection of evidence of myocardial dysfunction caused by ischemia or necrosis . Evaluation of wall motion while a patient is experiencing chest pain can be useful when the ECG is non diagnostic .
- Evaluation of wall motion may also be useful if there is ECG or laboratory evidence of MI even in the absence of chest pain .
- Severe ischemia produces regional wall motion abnormalities (RWMAs) that can be visualized echocardiographically within seconds of coronary artery occlusion (12±5 and 19±8 seconds in two series of patients evaluated during transient coronary occlusions induced by angioplasty) .

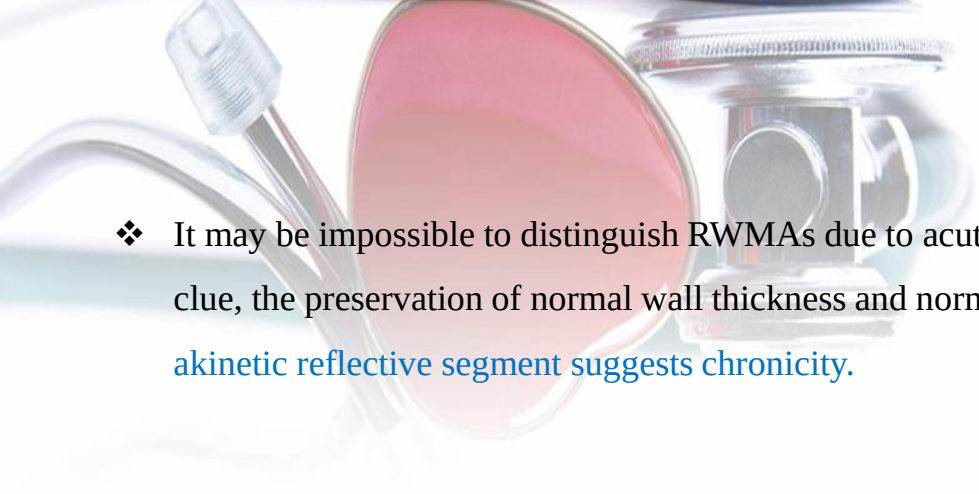
- These changes occur prior to the onset of ECG changes or the development of symptoms . The RWMAs reflect a localized decrease in the amplitude and rate of myocardial excursion, as well as a blunted degree of myocardial thickening and local remodeling.

DIAGNOSIS OF MI Use of echocardiography

- Since ischemic RWMAs develop prior to symptoms, chest pain in the absence of RWMAs should not be due to active myocardial ischemia.

- However, the converse is not true; the presence of RWMAs does not establish the diagnosis of ischemia. There are a number of other causes of RWMAs, including a prior infarction, focal myocarditis, prior surgery, left bundle branch block, ventricular preexcitation via an accessory pathway, and cardiomyopathy.

- Thus, echocardiography for an acute coronary syndrome (MI or unstable angina) has a high sensitivity but a relatively lower specificity .



- It may be impossible to distinguish RWMAs due to acute ischemia from those due to a previous MI. One clue, the preservation of normal wall thickness and normal reflectivity, suggests an acute event, while a thin akinetic reflective segment suggests chronicity.

- The presence of reversible RWMAs, as well as reversible ECG changes, is consistent with the diagnosis of myocardial ischemia. The time course of recovery after the cessation of chest pain is variable, ranging from less than two hours in patients with a short duration of chest pain (≤10 minutes) to more than 24 hours in patients with prolonged angina . This delay in recovery, which occurs in the absence of recurrent chest pain, may reflect myocardial stunning .

Differential diagnosis :

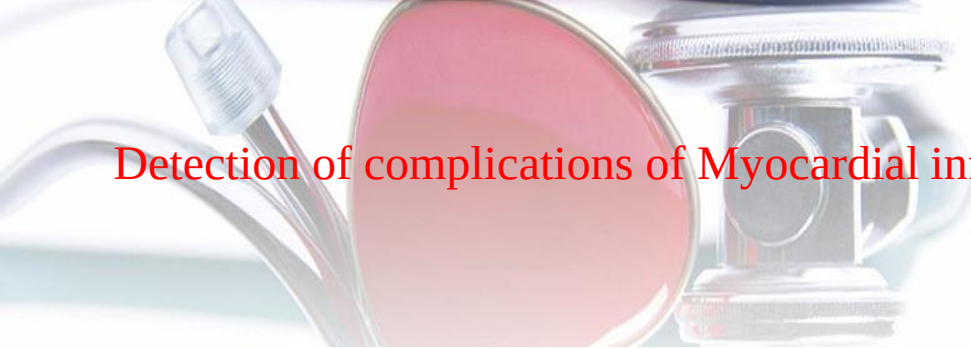
- When evaluating suspected MI, other causes of new RWMAs should be considered including myocarditis and stress (also known as takotsubo or apical ballooning) cardiomyopathy.

- Patients with stress cardiomyopathy typically present with chest pain, ECG changes, and cardiac enzyme elevations with normal coronary arteries.

- Significant wall motion abnormalities can be identified with echocardiography, most commonly affecting the apical and mid portions of the ventricle; other variants, including a type with midventricular hypokinesis, have been described. Wall motion usually returns to normal after a period varying from days to several months.

LOCATION AND EXTENT OF MI :

- Echocardiography can identify the location and extent of the infarct Regional wall motion abnormalities (RWMAs) correlate closely with other methods of assessing an MI such as pathology ,left ventriculography, computed tomography, magnetic resonance imaging, or nuclear perfusion imaging.

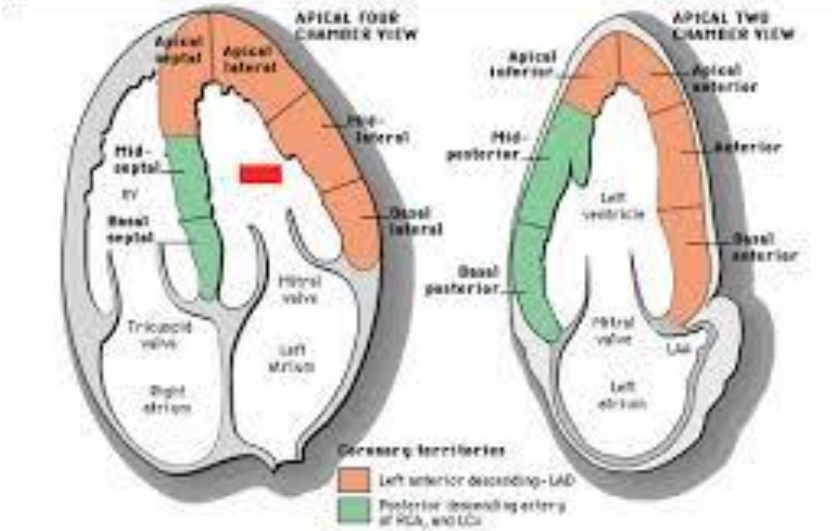


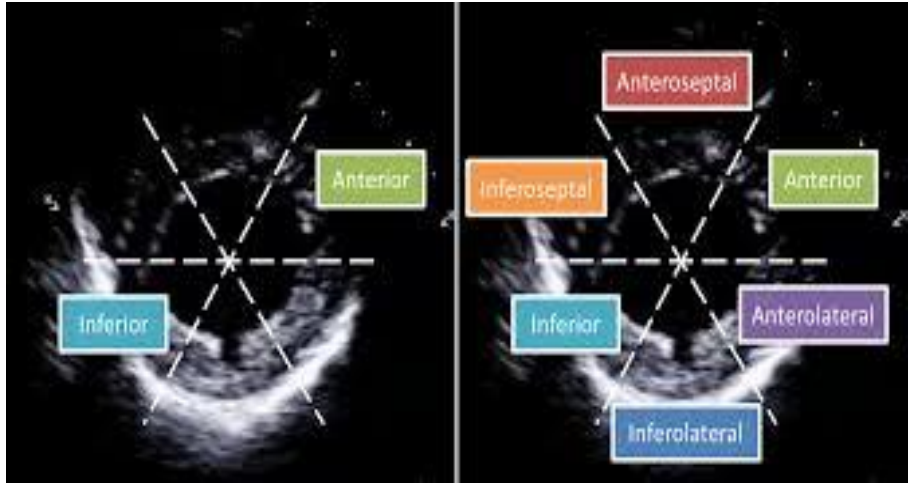
Detection of complications of Myocardial infraction

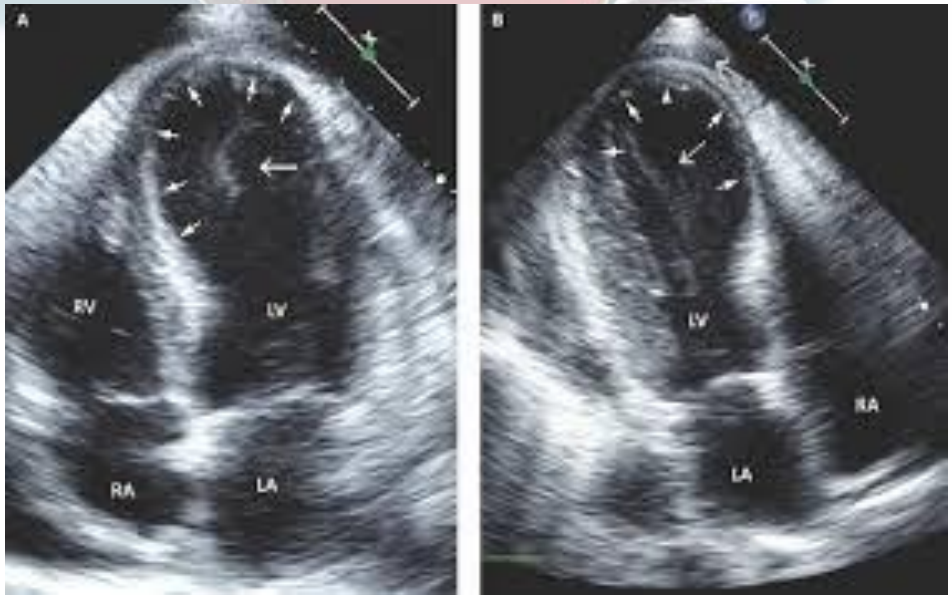
- Ventricular Free Wall Rupture
- Pseudoaneurysm Formation
- Ventricular Septal Rupture
- Acute Mitral Regurgitation Secondary to Papillary Muscle Rupture
- Pericardial Effusion and Tamponade
- Infarct Expansion and True Aneurysm Formation

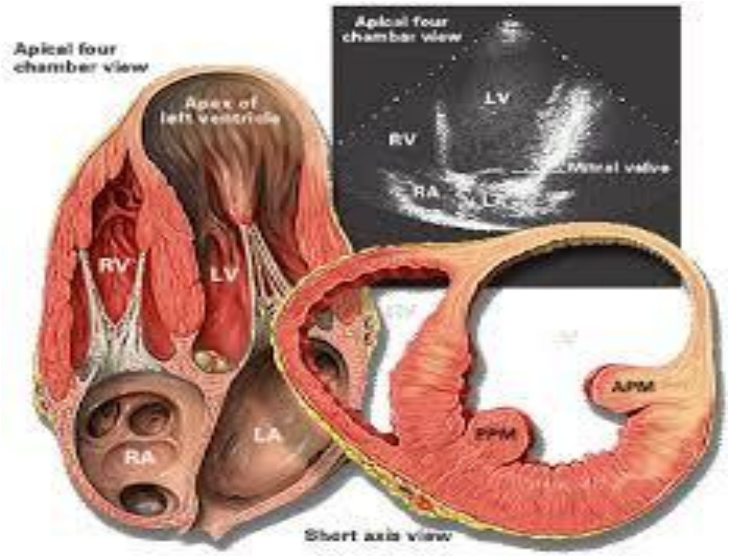
Detection of complications of Myocardial infraction

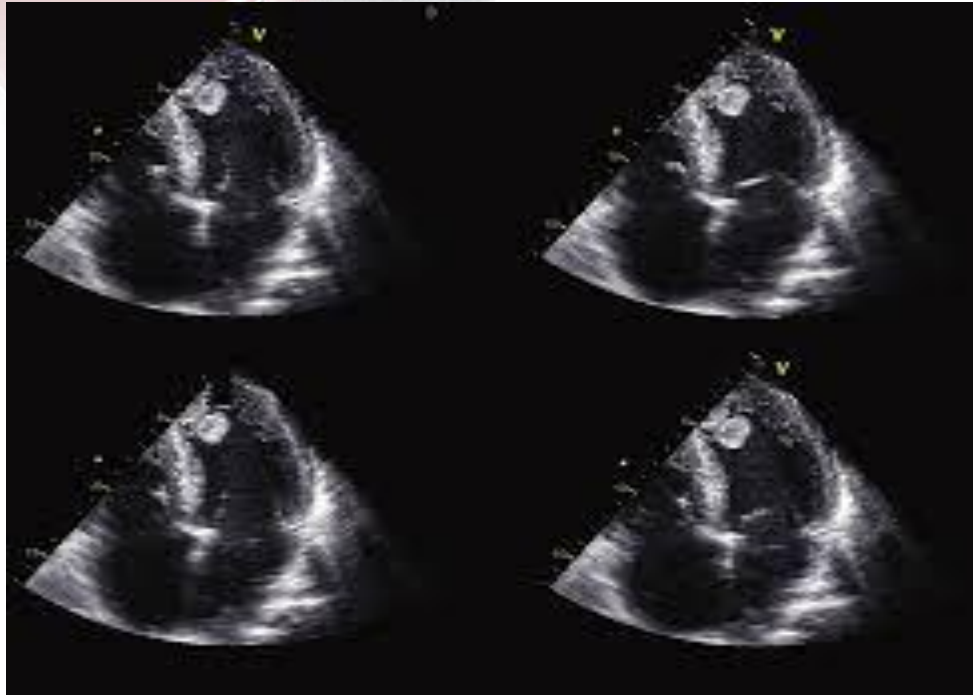
Caution : In apical 4 chamber view *mid-septal* wall motion defect implies *an Inferior MI* !



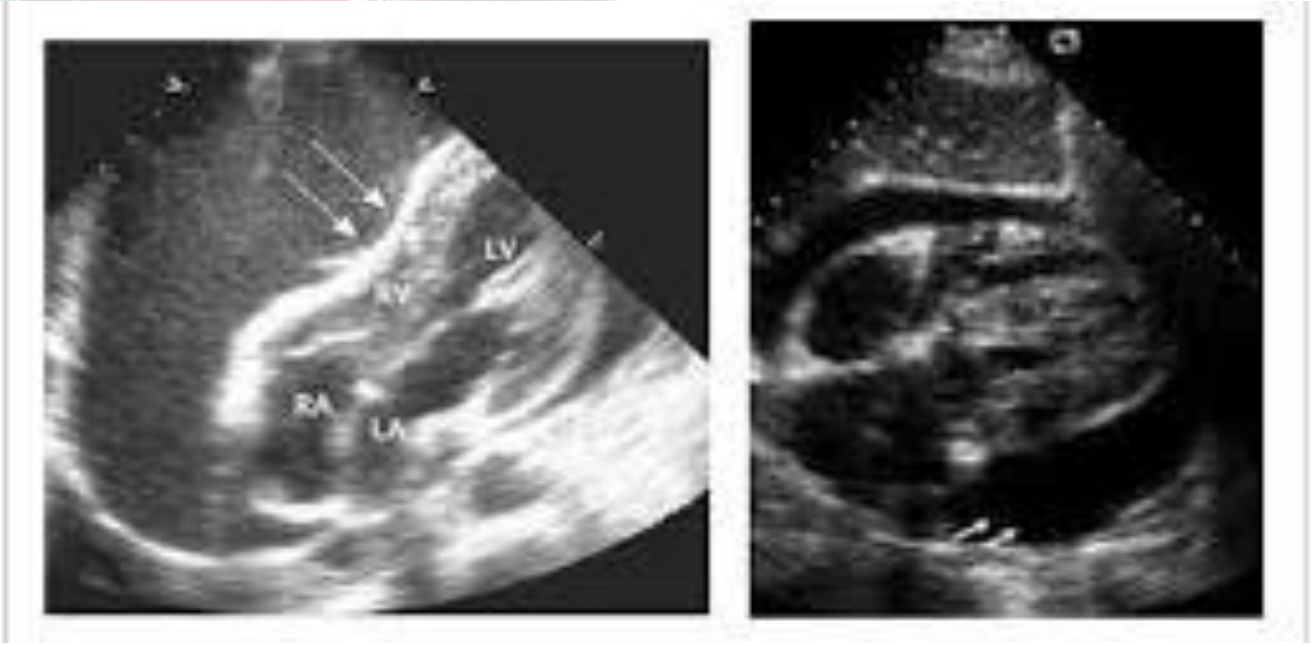


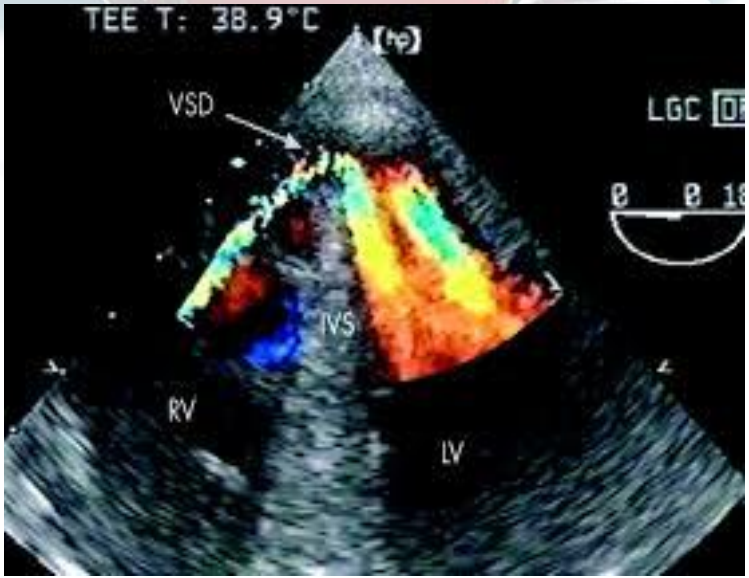

A
RV
LV
RA
LA
B
LV
RA
LA

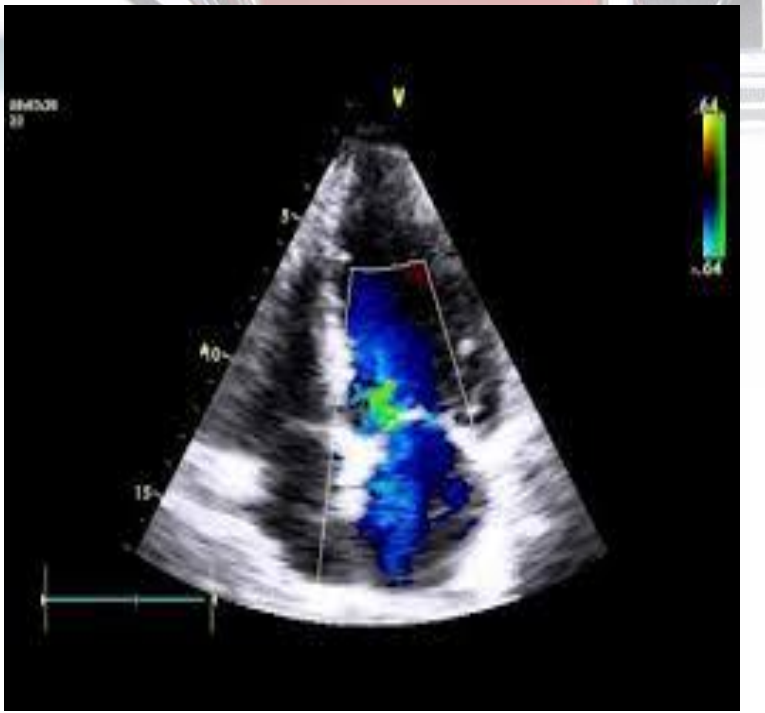

Apical four chamber view
Apex of left ventricle
RV
LV
RA
LA
APM
PPM
Short axis view
Apical four chamber view
LV
RV
Mitral valve
RA

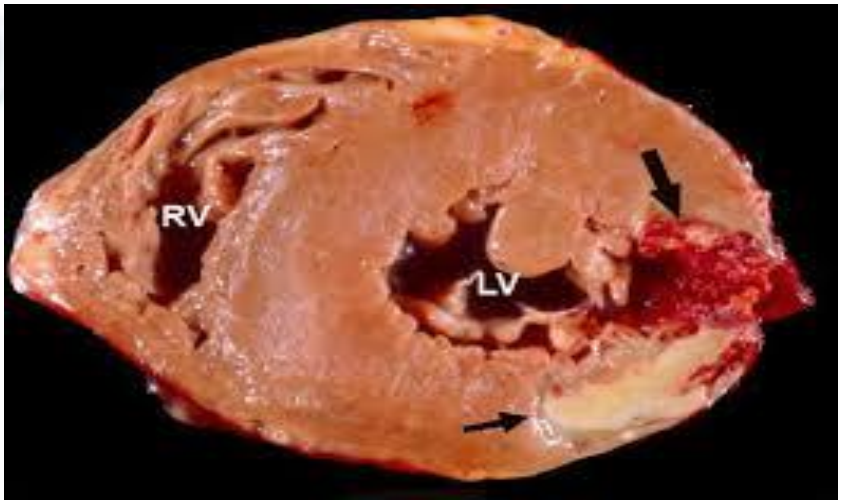


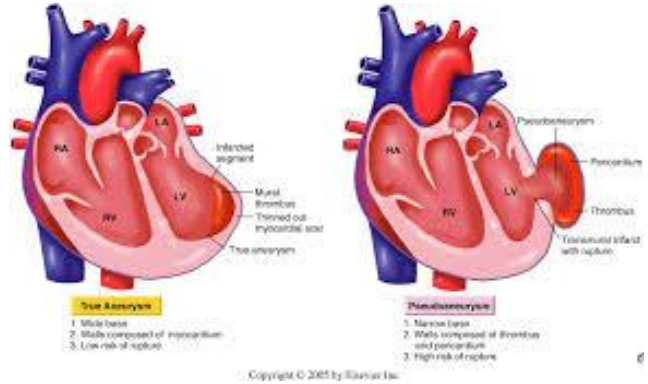
Tamponade




TEE T: 38.9°C
VSD
LGC
IVS
RV
LV

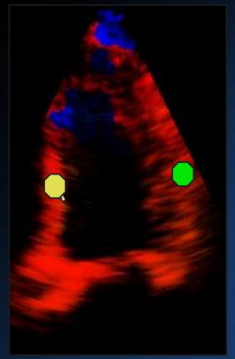


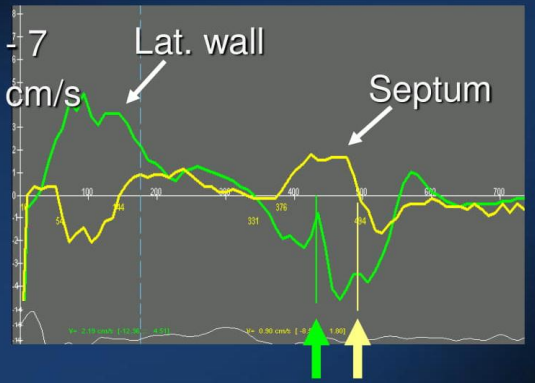




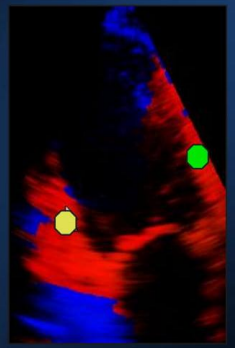
Acute Myocardial ischemia

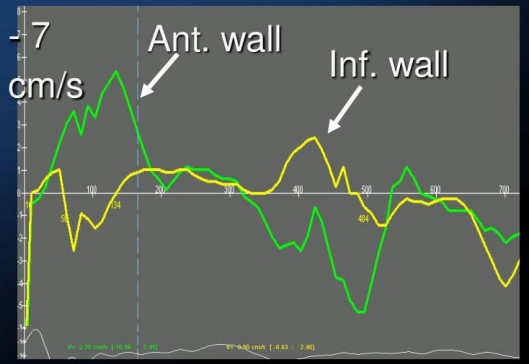
4 chamber view





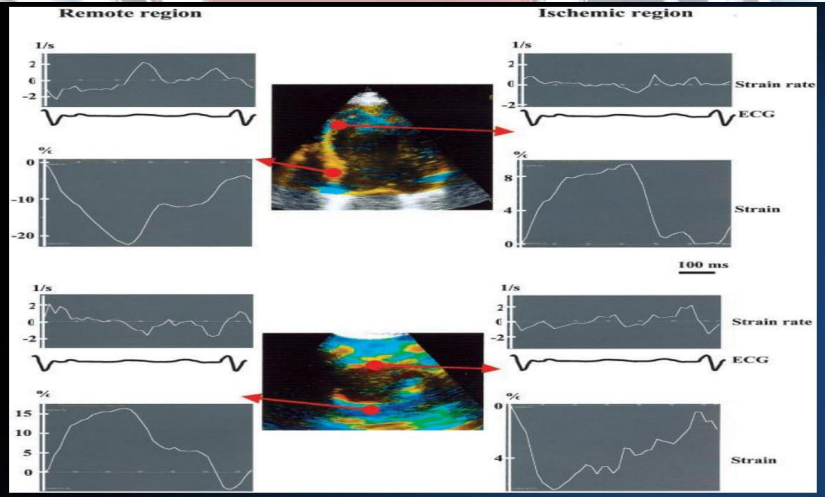
2 chamber view





LH 00

Regional function by TDI



- TDI derived SR can identify and quantify ischemic myocardial abnormalities and Identify viable myocardium

- Acute coronary occlusion reduced peak systolic strain in radial and longitudinal directions in ischemic regions and after reperfusion returned close to preoclusions value

- Ultrasonic strain indexes differentiate acutely ischemic segments from normal's .

Kukulski T et all.JACC2002