

**Unlocking the Asian Mystery :
Preventing Hemodynamic Collapse
During Complex PCI without Direct
Left Ventricular Assist Devices**

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Methodist Hospital, Merrillville IN
December 2015**

**How did the Asian cardiologists do
PCI for LM or MVD since 1995?
No LVAD and No Surgical Back-up**

Dopamine IV

Norepinephrine IV

From: QRS Changes During Percutaneous Transluminal Coronary Angioplasty and Their Possible Mechanisms

J Am Coll Cardiol. 1997;30(2):452-458. doi:10.1016/S0735-1097(97)00165-4



Figure Legend:

Superposition of the ECG before and during RCA occlusion in leads aVF and V₃ in a patient whose QRS duration was increased by 32 ms in lead aVF and by 10 ms in lead V₃. (See text.)

During PCI, which blood pressure do you need to monitor closely?



1. *AOS*
2. *AOD*
3. *AOM*
4. *PP*

Kathy F 3/9/2015

EKG: Non specific STT changes

DR 148 (L180) * CONSIDER LEFT ATRIAL ABNORMALITY (Insig. Chg.)
[LVOLFB] - [Now Absent] LOW VOLTAGE IN FRONTAL LEADS
QRSD 74 [IMI62] + INFERIOR INFARCT, AGE INDETERMINATE (Now Present)
QT 352 [AMI44] = CONSIDER ANTERIOR INFARCT (Remains)
QTc 426 [LLINV] ? LATERAL LEADS ARE ALSO INVOLVED (Insig. Chg.)
- STMT - * Non specific STT changes. Clinical correlation requested
[SIGCC] - SIGNIFICANT ECG CONTOUR CHANGES

Ref Phys Fax#: ED999992

Order #: 80855063
Enc ID: 112448211

-- AXIS --
P 78
QRS -70
T 97

- ABNORMAL ECG -

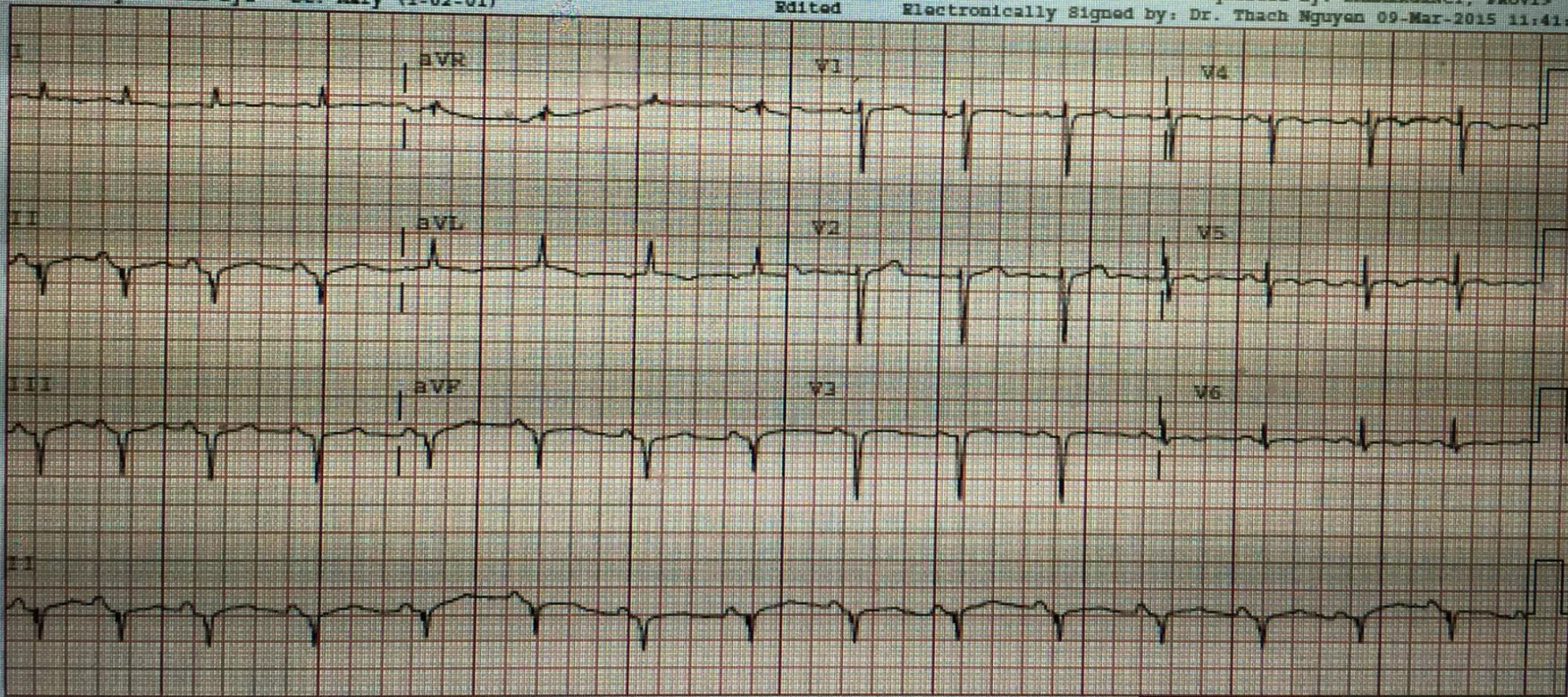
Compared to: 04-Feb-2015 21:21:52 - Borderline Confirmed



Community Health Sys - St. Mary (1-02-01)

Edited

Electronically Signed by: Dr. Thach Nguyen 09-Mar-2015 11:41:57



Device: EM-ED01

Speed: 25 mm/sec

Limb: 10 mm/mV

Chest: 10 mm/mV

F 60- 0.5-100 Hz W

PR090AS22 CL P7

Kathy F 3/12/2015

HR 78 [SR] = SINUS RHYTHM [Remains]
[AXL] ? BORDERLINE LEFT AXIS DEVIATION [Insig. Chg.]
PR 168 [LVOLP] = LOW VOLTAGE IN FRONTAL LEADS [Remains]
[REPPAL] ? REPOL ABNRM, PROBABLE ISCHEMIA, ANT-LAT LEADS [Insig. Chg.]
QRSB 80 [LQT] = PROLONGED QT INTERVAL [Remains]
QT 452 [NSIGC] = NO SIGNIFICANT CHANGE
QTc 515

Acct #: 112448211

Ref Phys Fax#: 2197561410

-- AXIS --

P 54

QRS -25

T 204

- ABNORMAL ECG -

Compared to: 11-Mar-2015 12:43:25 - Abnormal Unconfirmed

Order #: 82237858

Enc ID: 112448211

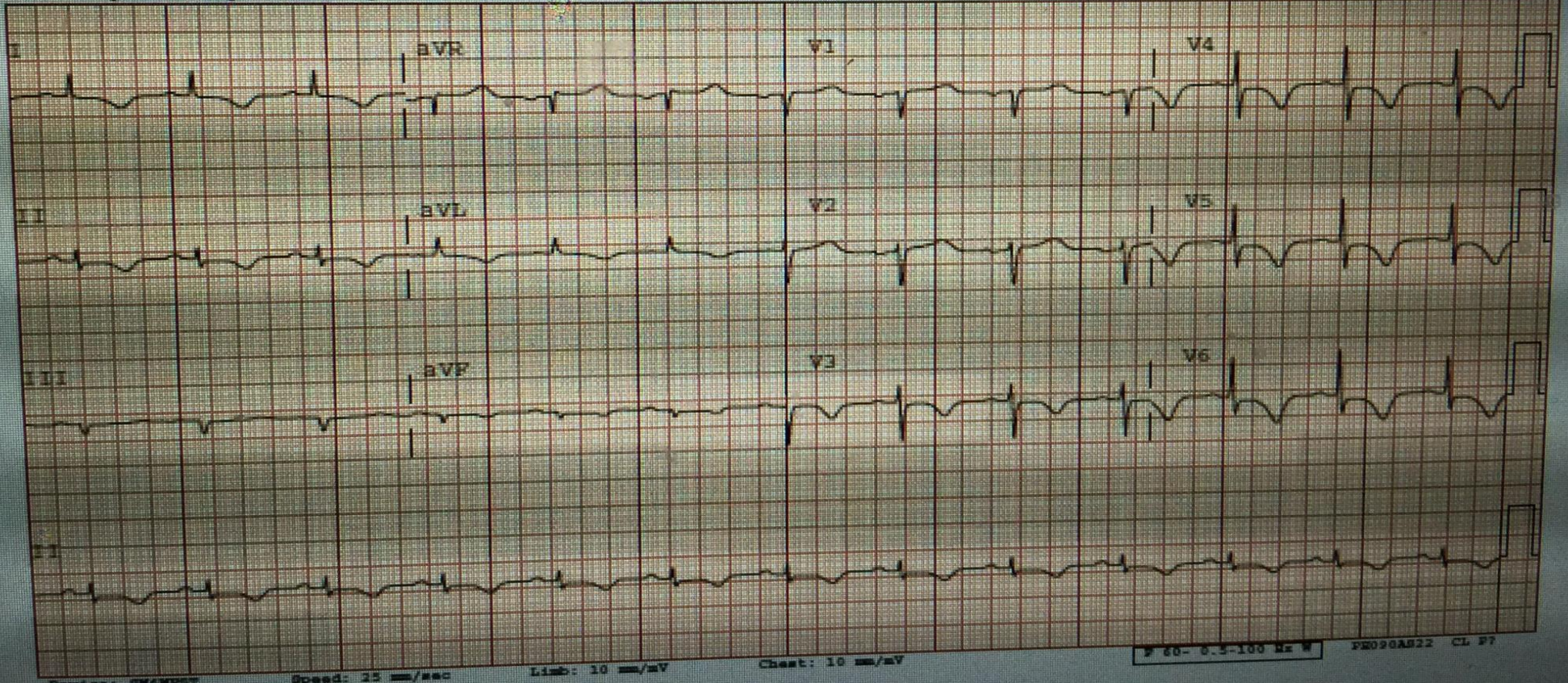
Reason: pre-angio

Standard 12

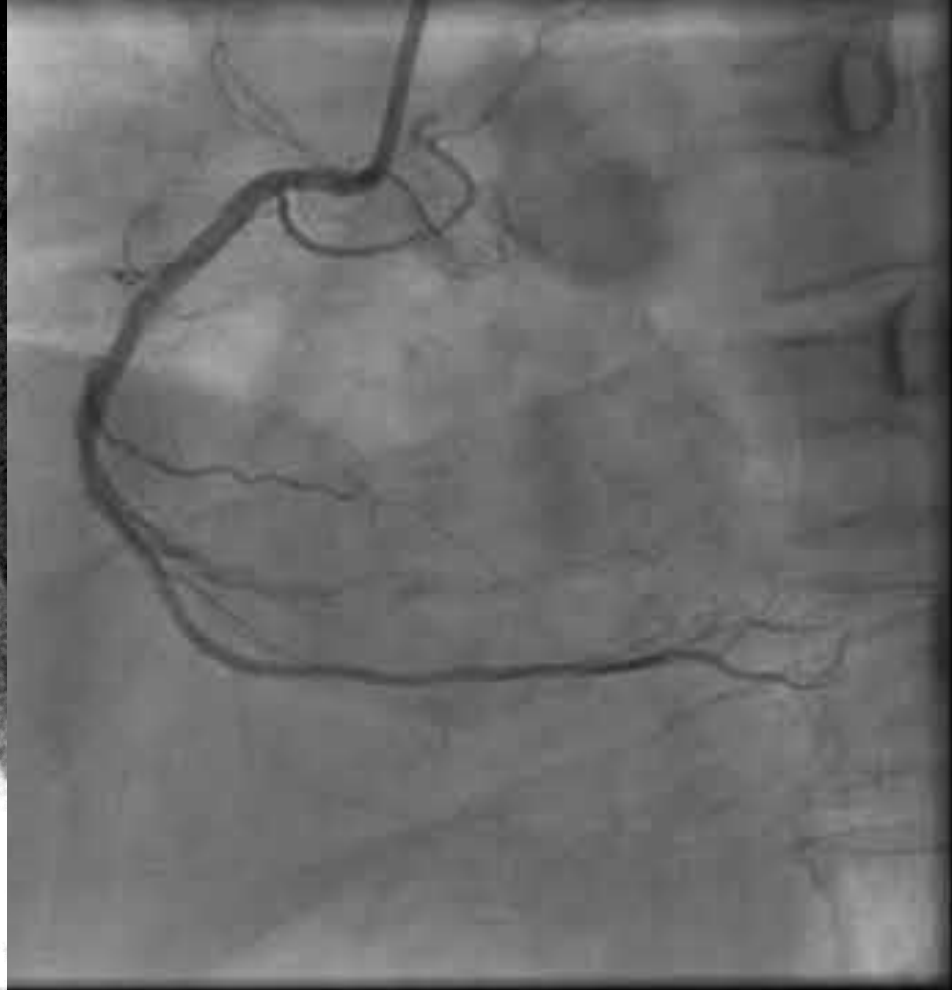
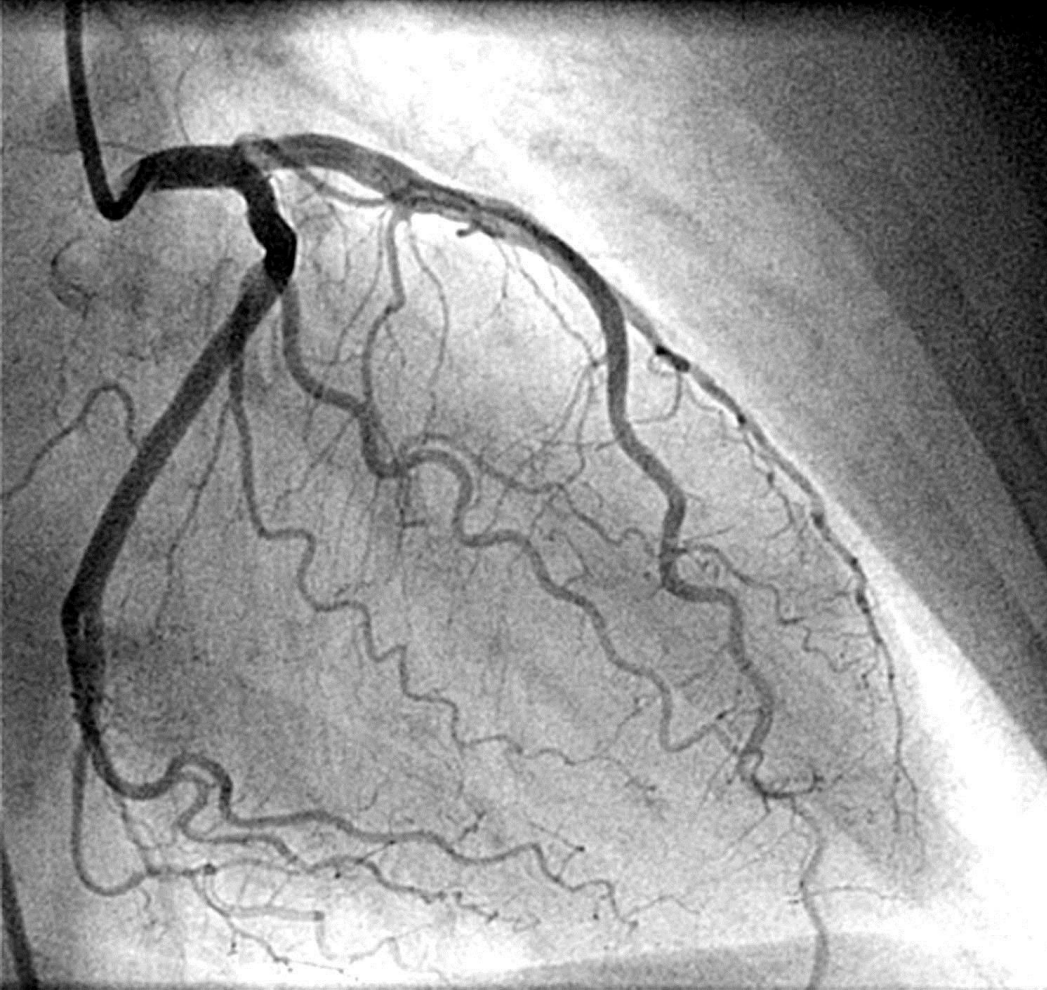
Requested By: NGUYEN, THACH

Electronically Signed by: Dr. Thach Nguyen 12-Mar-2015 18:09:42

Community Health Sys - St. Mary (1-02-09)

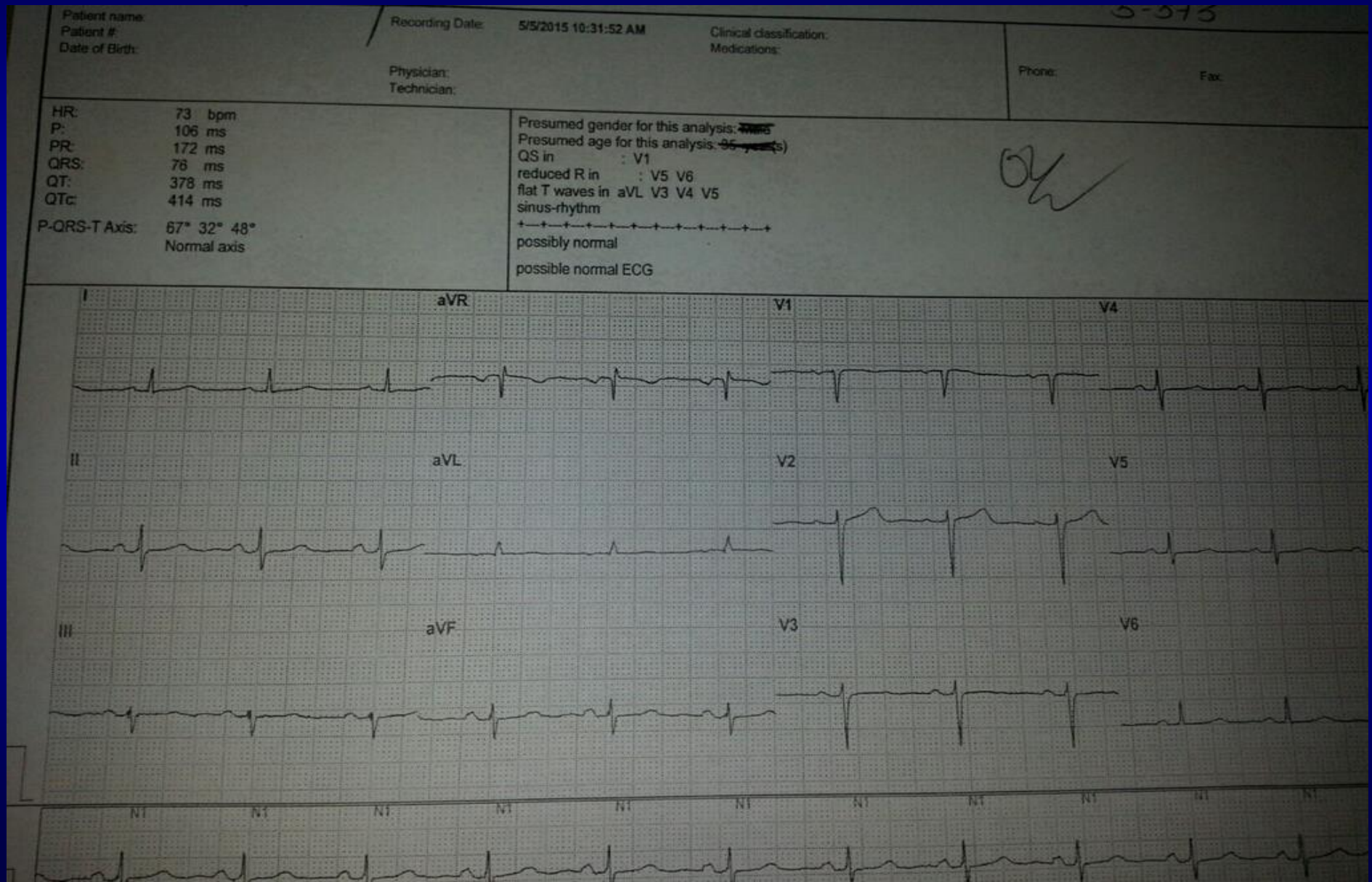


BP 77/52mmHg
AOM= 60 mmHg
LVEDP=38



Kathy F

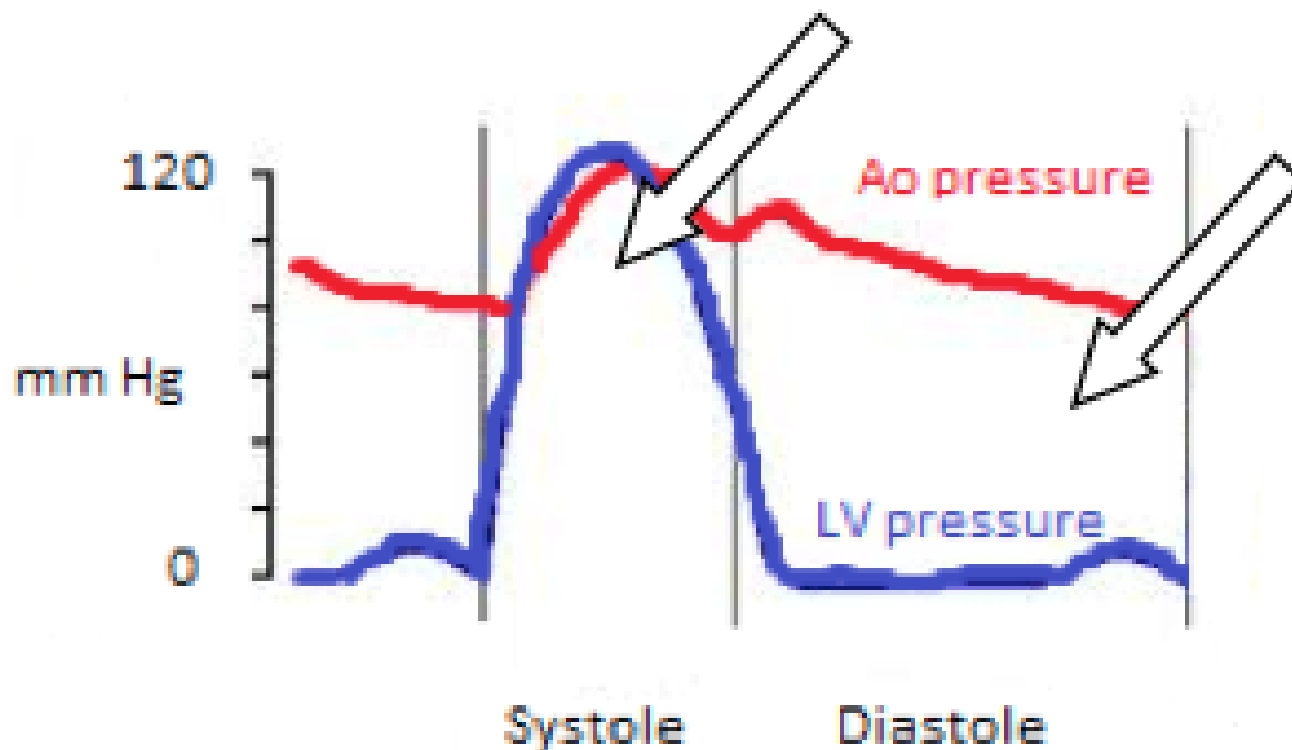
5/5/2015 (normal EKG)



**How could we explain the
ischemia and chest pain?**

Coronary Perfusion Pressure (CPP)= AOD-LVEDP

No gradient, no
coronary filling



Gradient drives
coronary filling

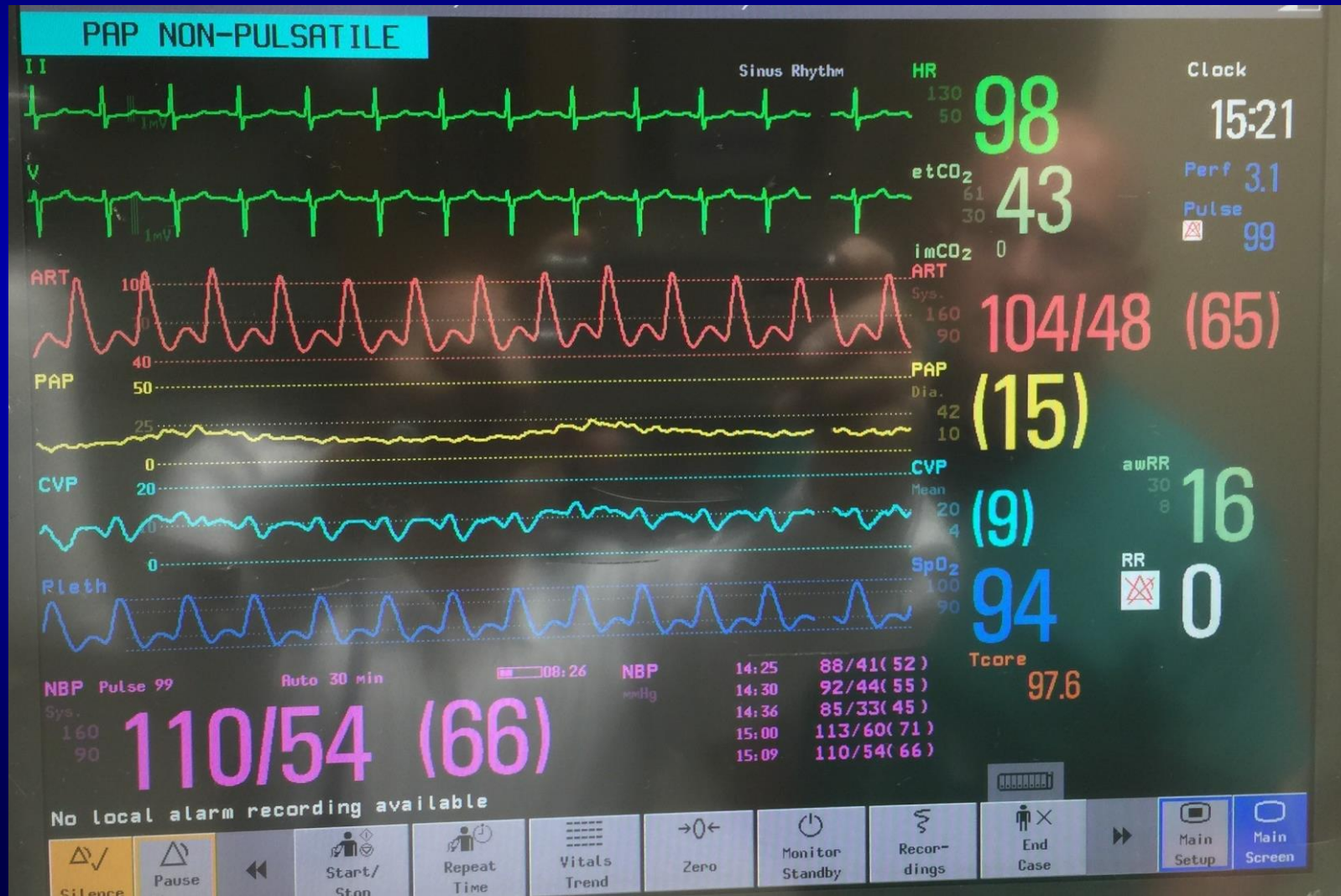
BP 77/52mmHg

LVEDP=38

Coronary Perfusion pressure= 52-38=14mmHg

**We are used to look at the systolic BP to be
>90mmHg or the AOM>60mmHg**

KM CPP = AOD-PCWP = 48-15 = 27



KM CPP=27

PR 164
QRSD 82
QT 388
QTc 473

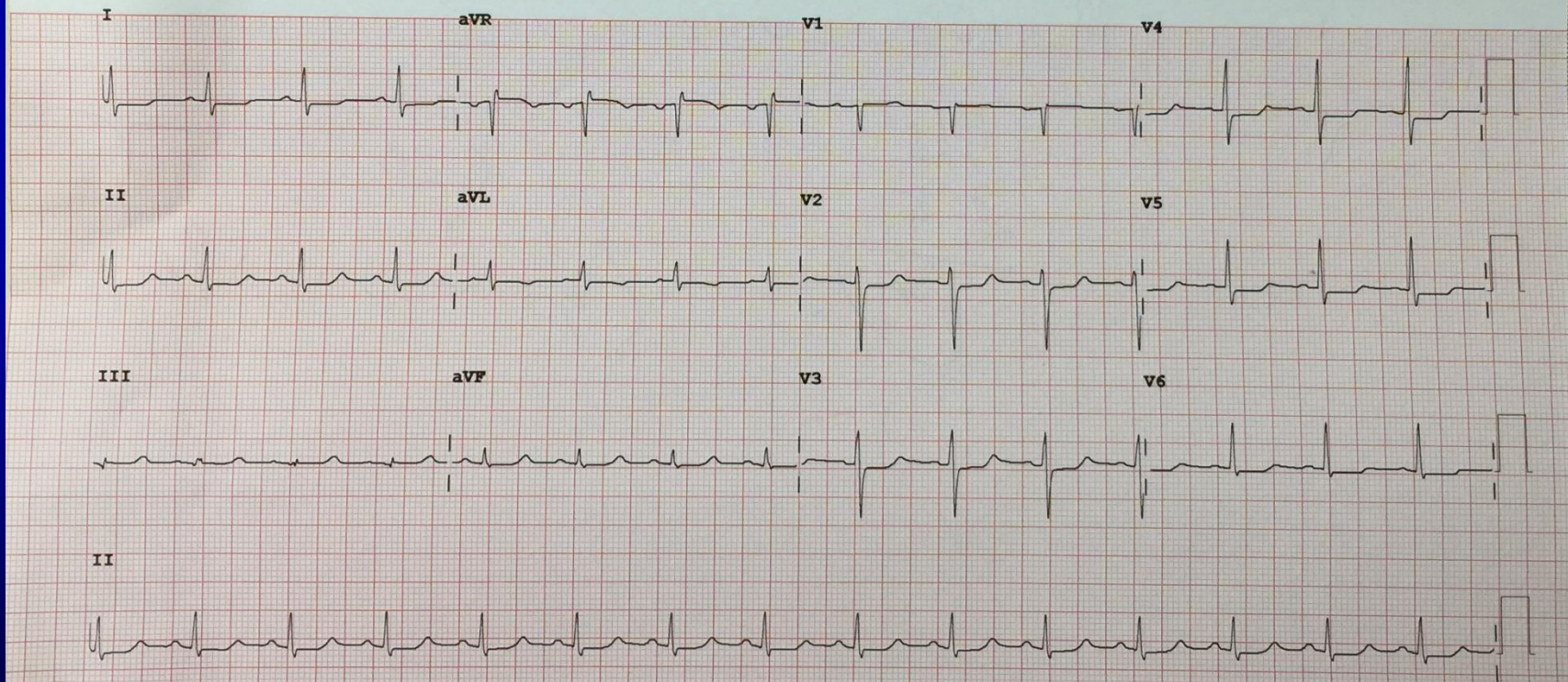
--AXIS--
P 54
QRS 37
T 94

MINIMAL ST DEPRESSION, ANTEROLATERAL LEADS.....ST <-0.03mV, I aVL V2-V6

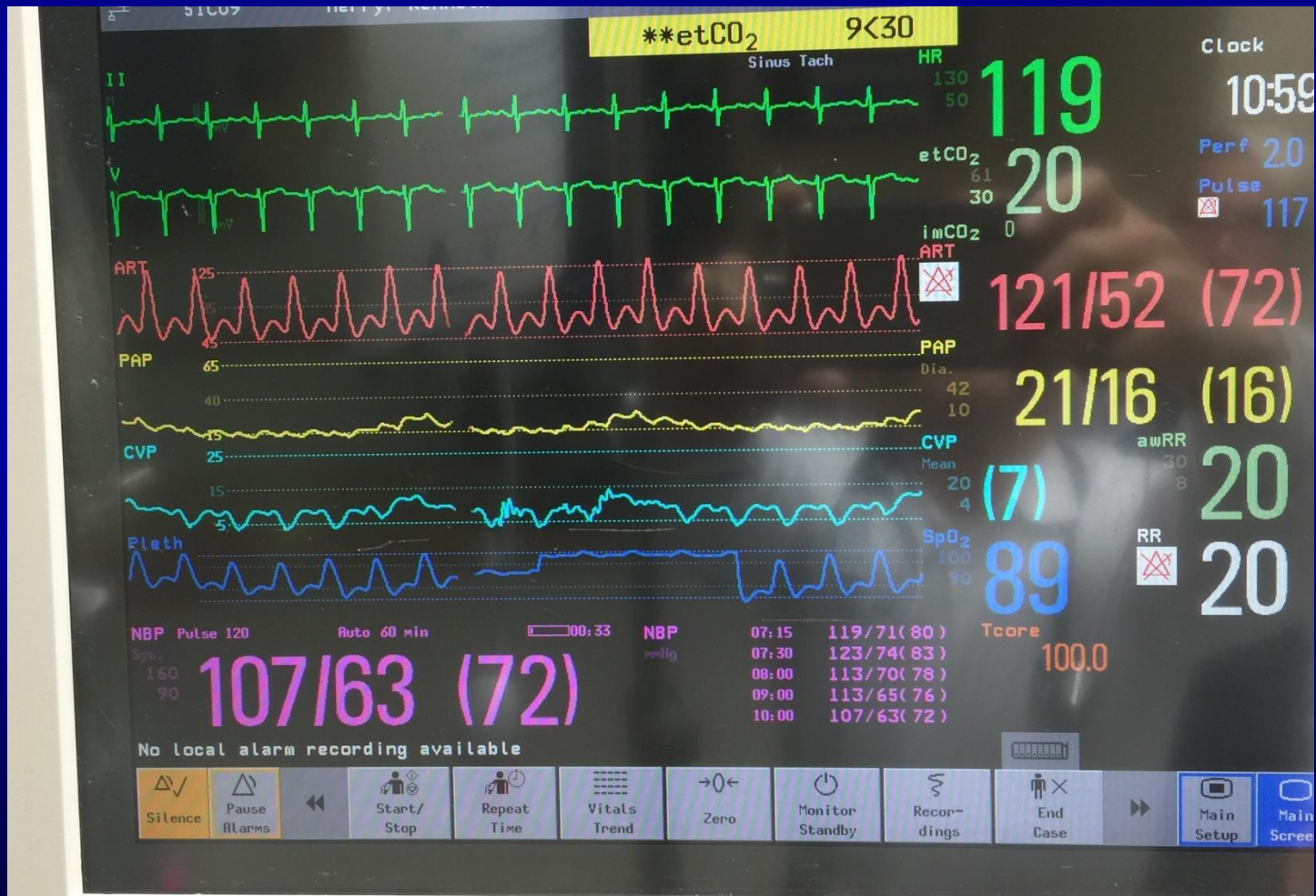
Order: 85744330
Fac: St. Mary (02)

- OTHERWISE NORMAL ECG -

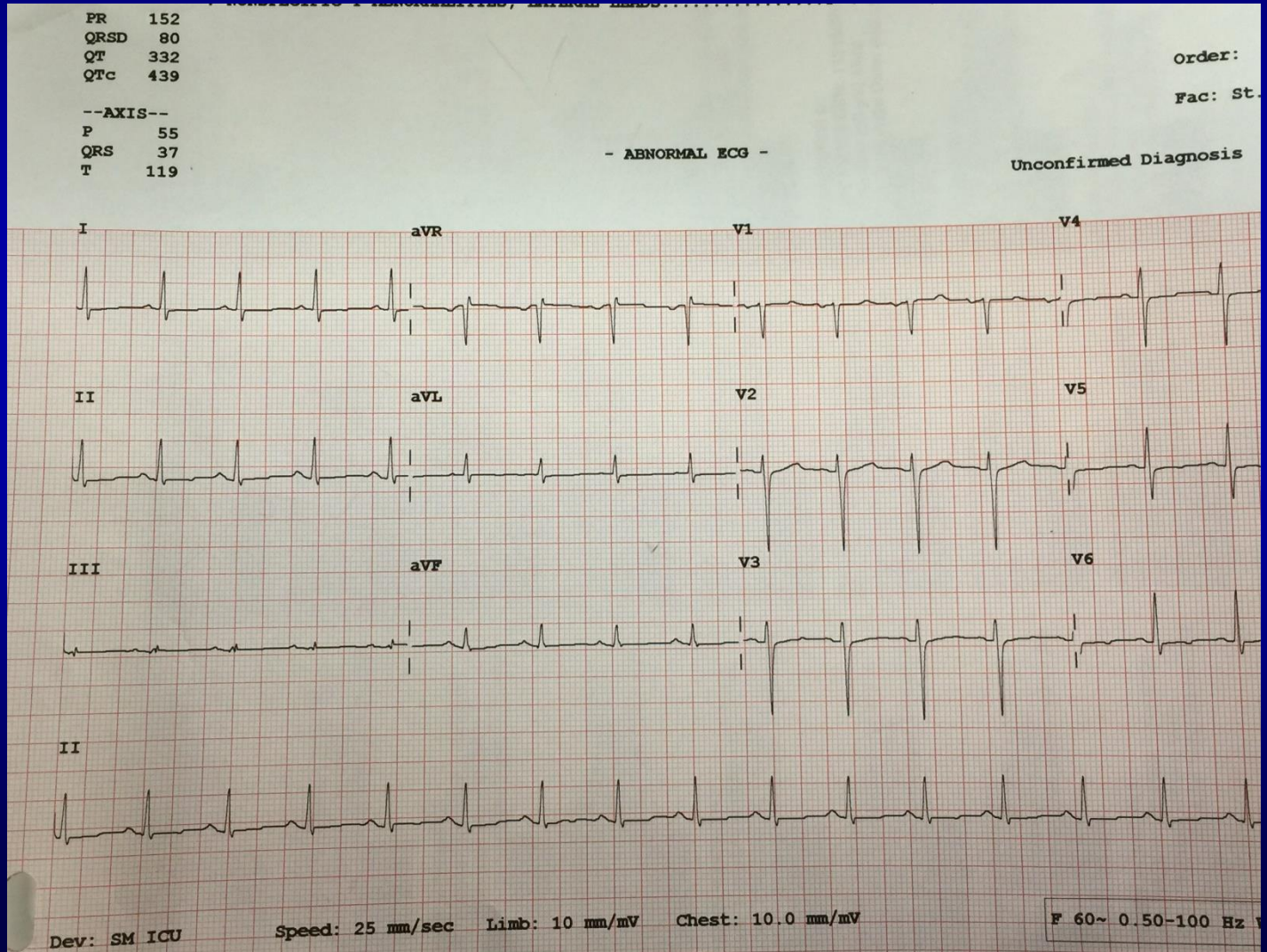
Unconfirmed Diagnosis



$$\text{CPP} = 52 - 16 = 32 \text{ mmHg}$$



KM CPP: 32mmHg



How do you know that it is global ischemia, and not due to a significant focal lesion?

Kathy F 3.12.2015

T wave inversion in I, L, 2 F, V3-V4

HR 78 [SR] = SINUS RHYTHM [Remains]
[AXL] ? BORDERLINE LEFT AXIS DEVIATION [Insig. Chg.]
PR 168 [LVOLP] = LOW VOLTAGE IN FRONTAL LEADS [Remains]
QRS 80 [REPPAL] ? REPOL ABNRM, PROBABLE ISCHEMIA, ANT-LAT LEADS [Insig. Chg.]
QT 452 [LOT] = PROLONGED QT INTERVAL [Remains]
QTc 515 [NSICC] = NO SIGNIFICANT CHANGE

Acct #: 112448211

Ref Phys Fax#: 2197561410

-- AXIS --

P 54

QRS -25

T 204

Compared to: 11-Mar-2015 12:43:25 - Abnormal Unconfirmed

- ABNORMAL ECG -

Order #: 82237858

Enc ID: 112448211

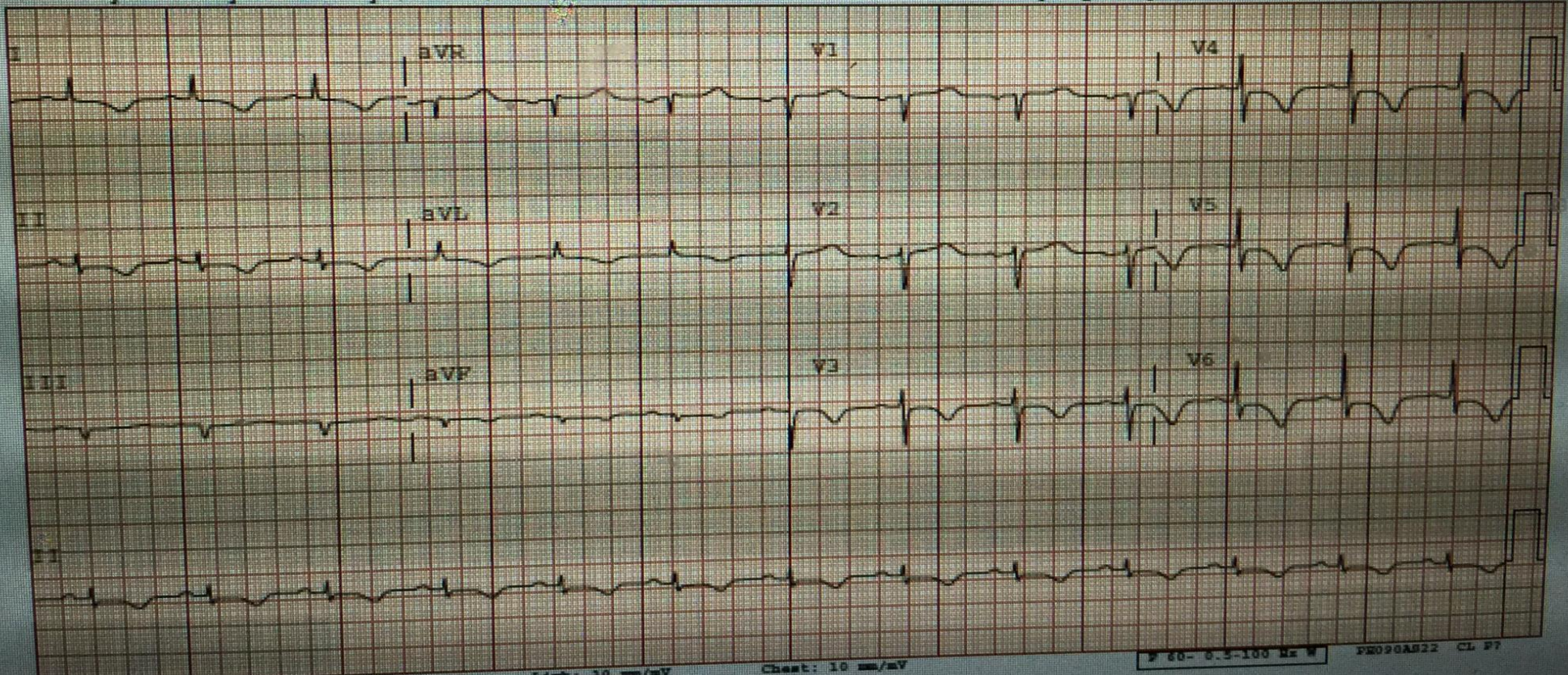
Reason: pre-angio

Standard 12

Requested By: NGUYEN, THACH

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KM ST depression in I, L V3-V6

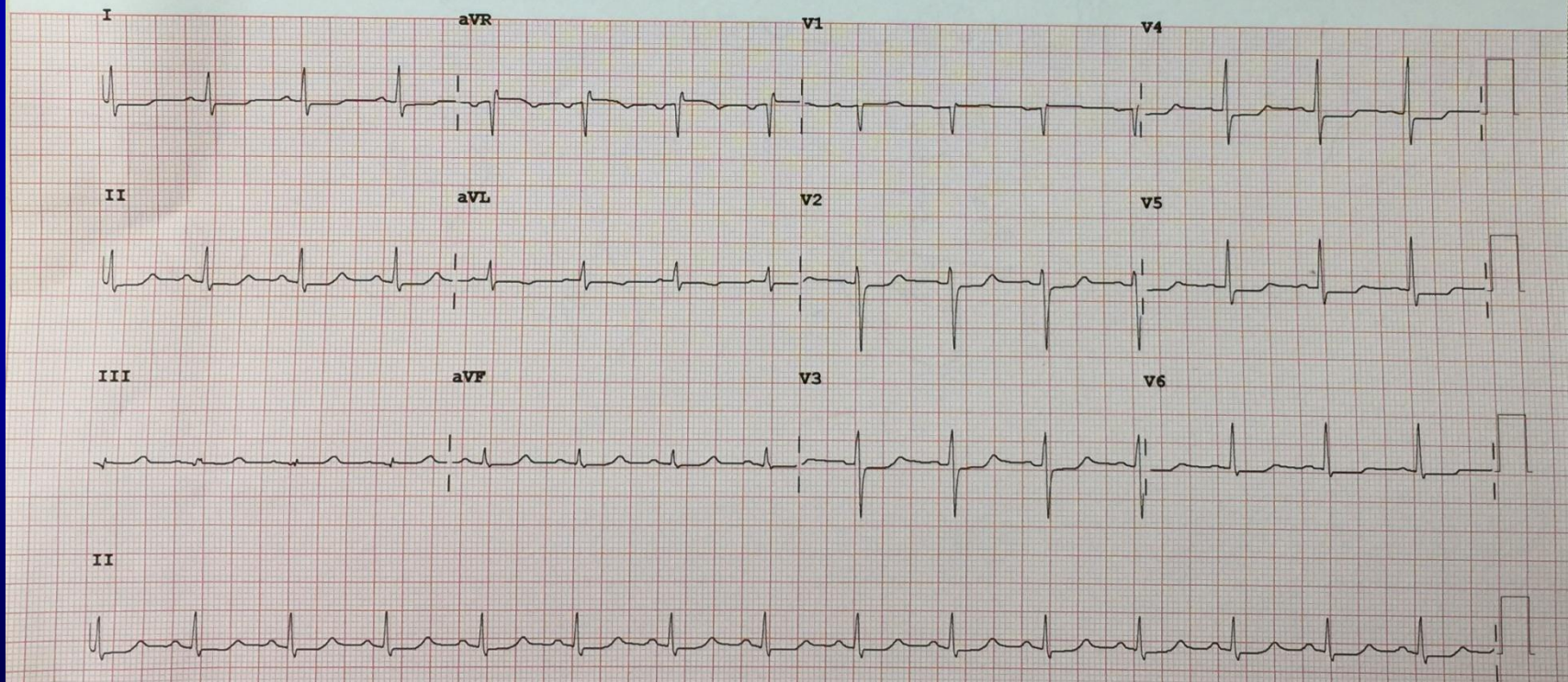
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QRSD 82
QT 388
QTc 473

--AXIS--
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QRS 37
T 94

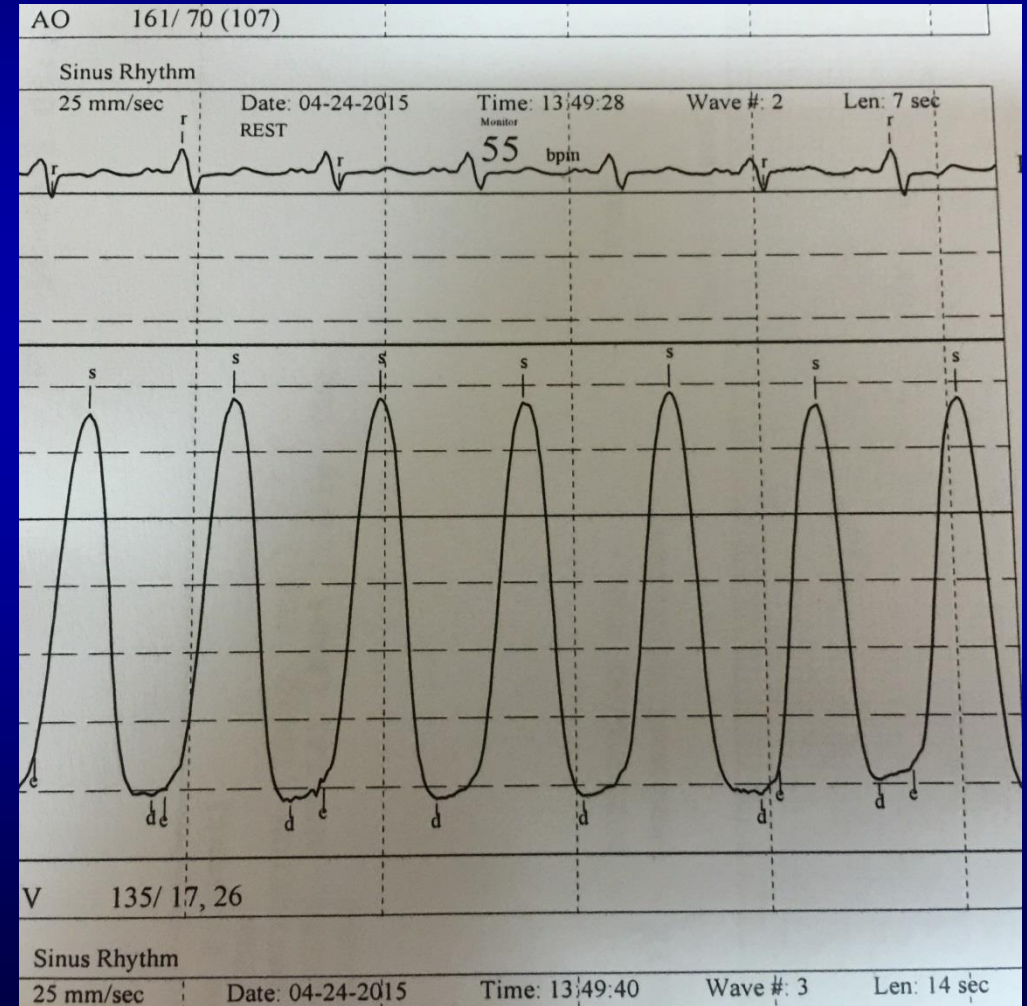
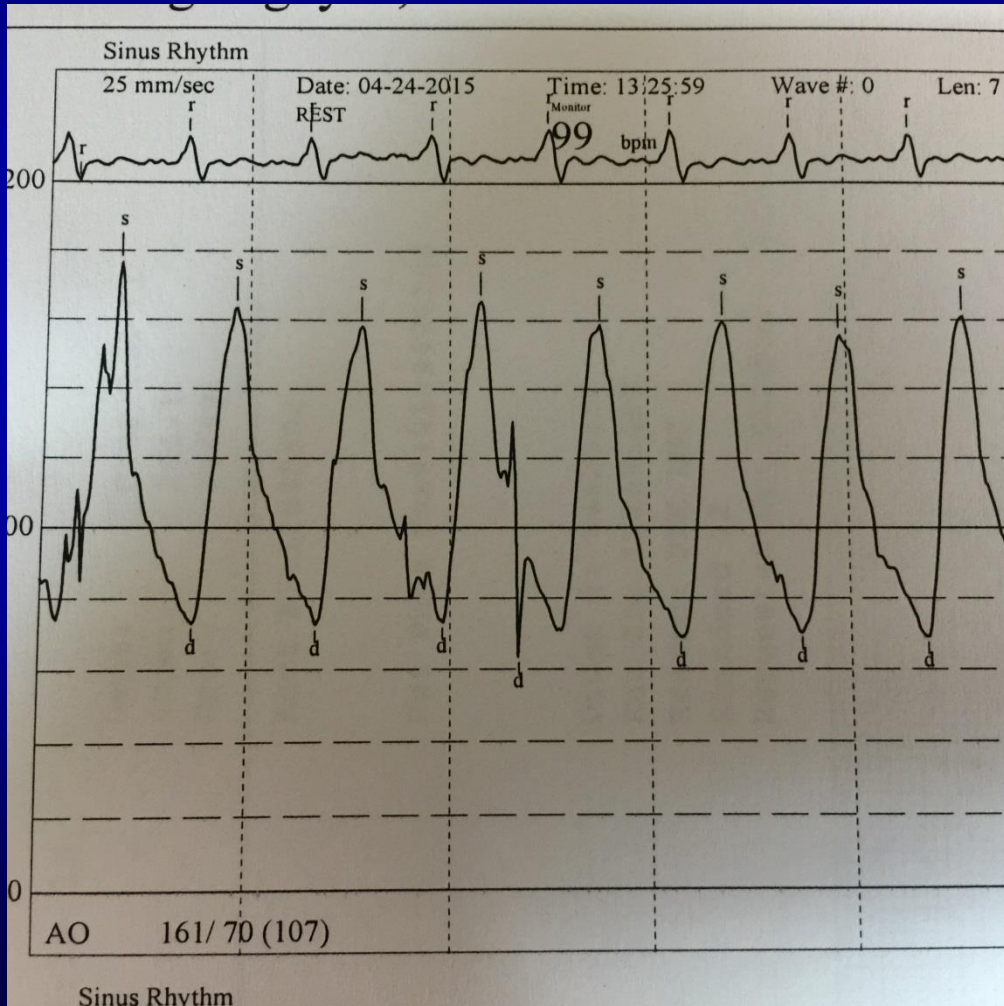
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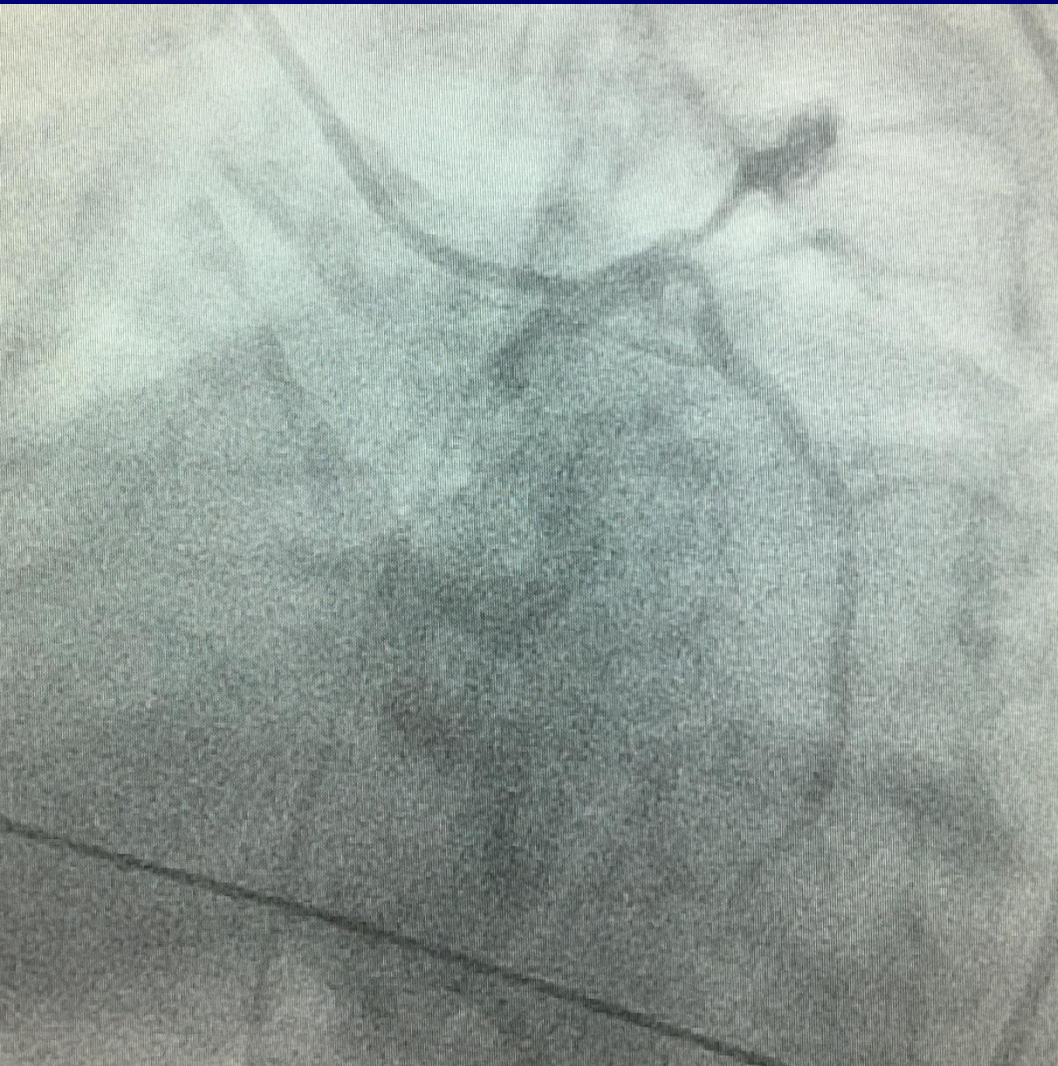
- OTHERWISE NORMAL ECG -

Unconfirmed Diagnosis



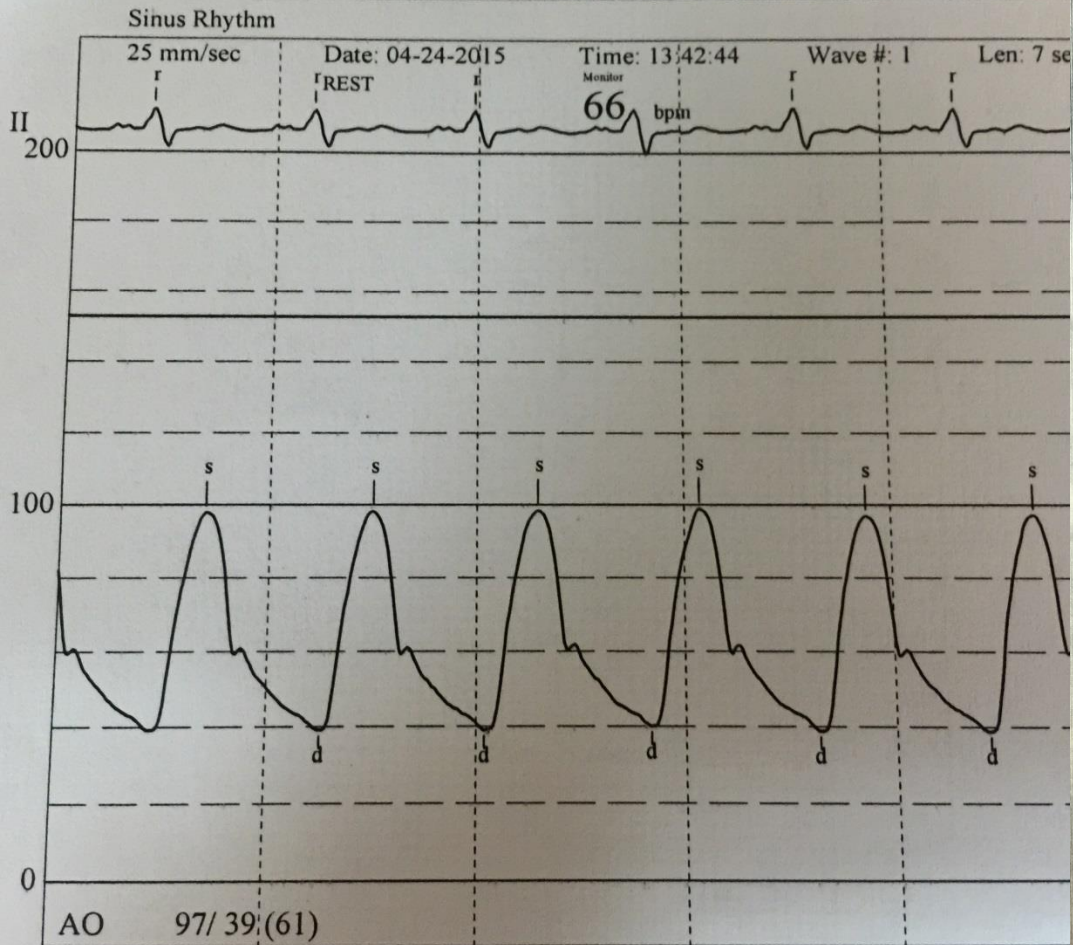
$$CPP = 70 - 26 = 44 \text{ mmHg}$$





$$\text{CPP} = 39 - 26 = 23 \text{ mmHg}$$

Procedure: Left Heart Cath



Date: 04-24-2015

th

b: K_{O_2} : 133 Est O_2 : 232.75 ml

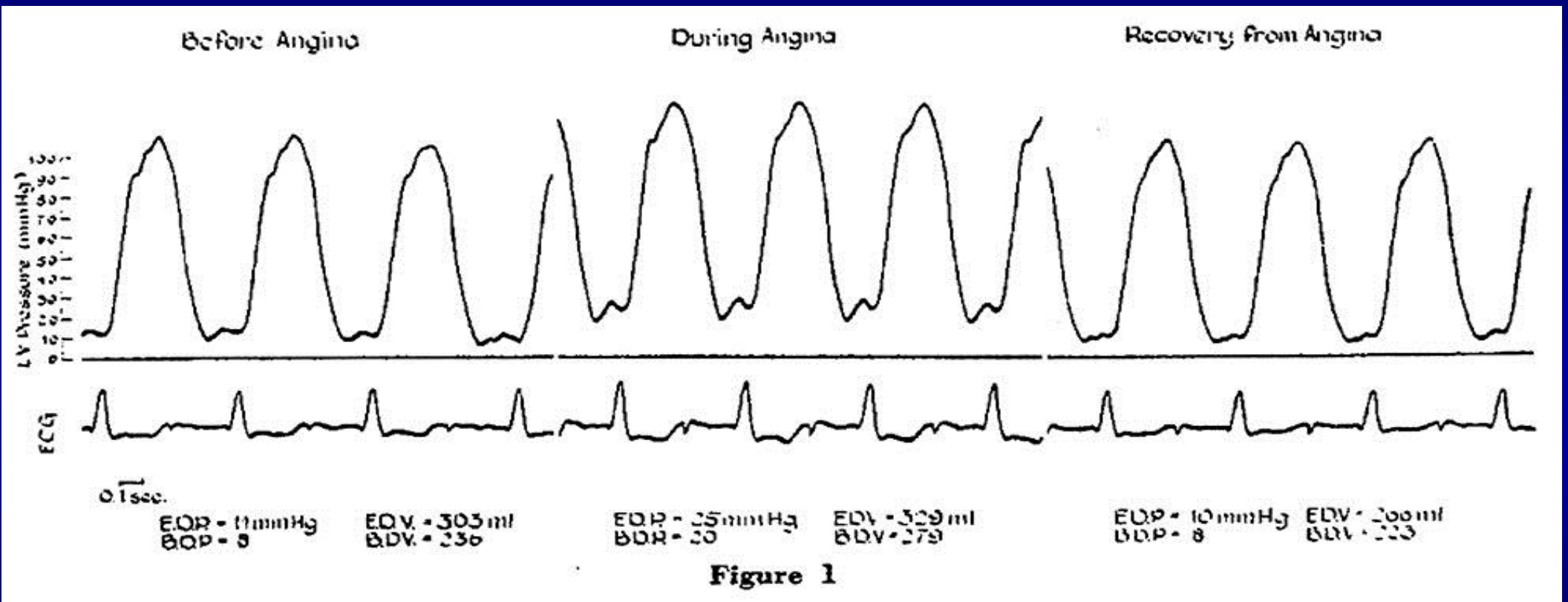
Heart Rate: 99

Samples

AO	161 / 70	(107)	SA	99 b/m	13:25:59
AO	97 / 39	(61)		66 b/m	13:42:44
LV	135 / 17,	26		55 b/m	13:49:28
LVp	136 / 15,	27		77 b/m	13:49:40
AOp	115 / 43	(74)		66 b/m	13:49:47

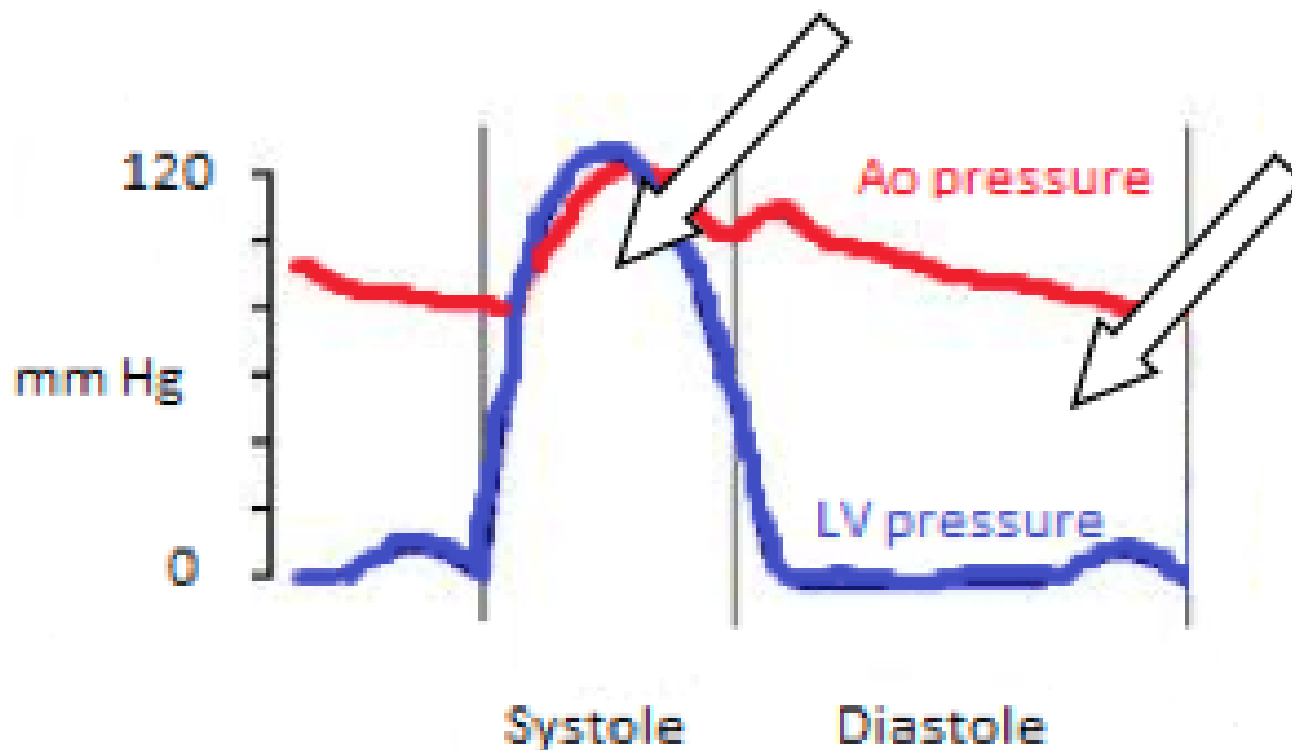
Summaries of What We Know

Left Ventricular End Diastolic Pressure

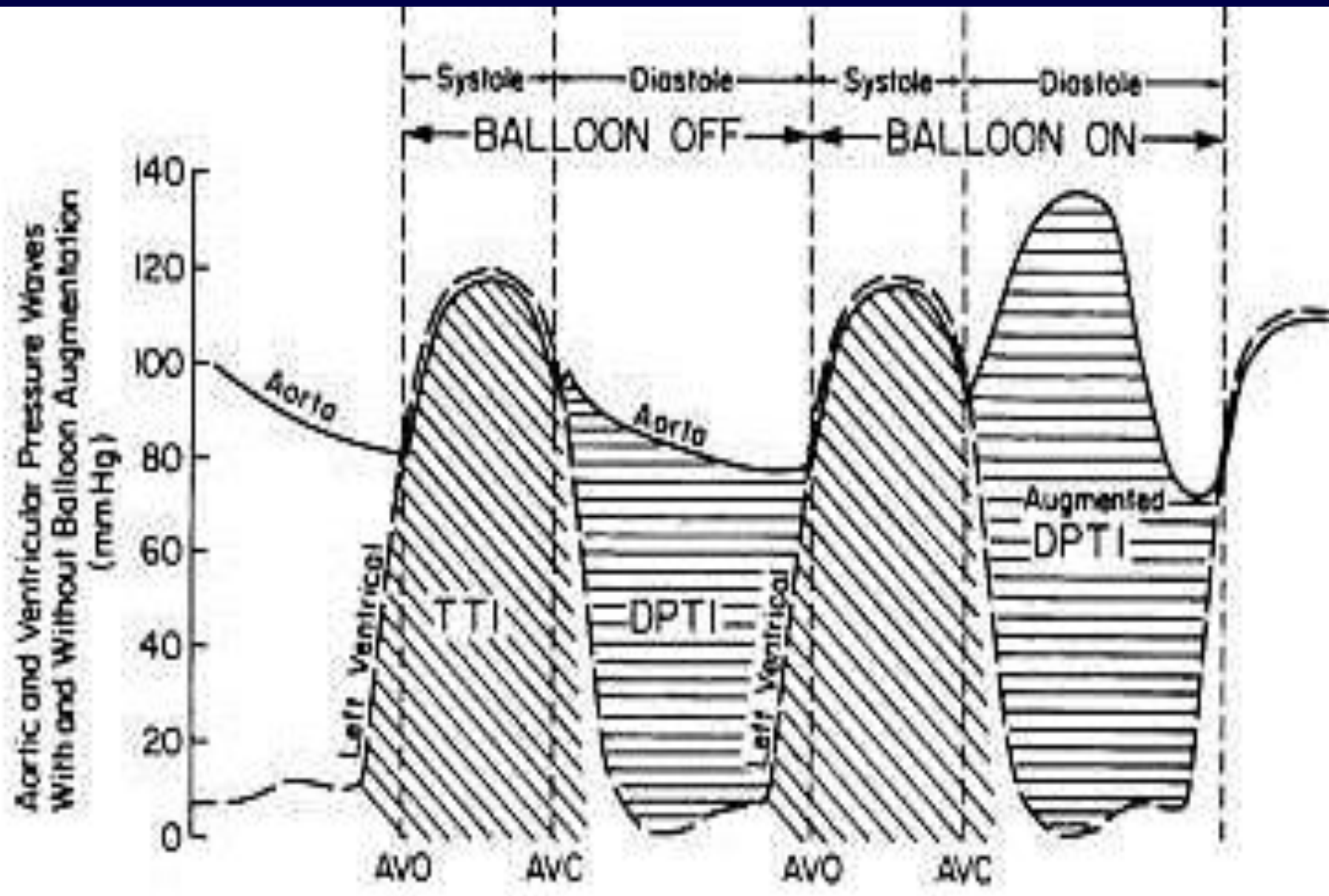


Coronary Perfusion Pressure (CPP)= AOD-LVEDP

No gradient, no
coronary filling

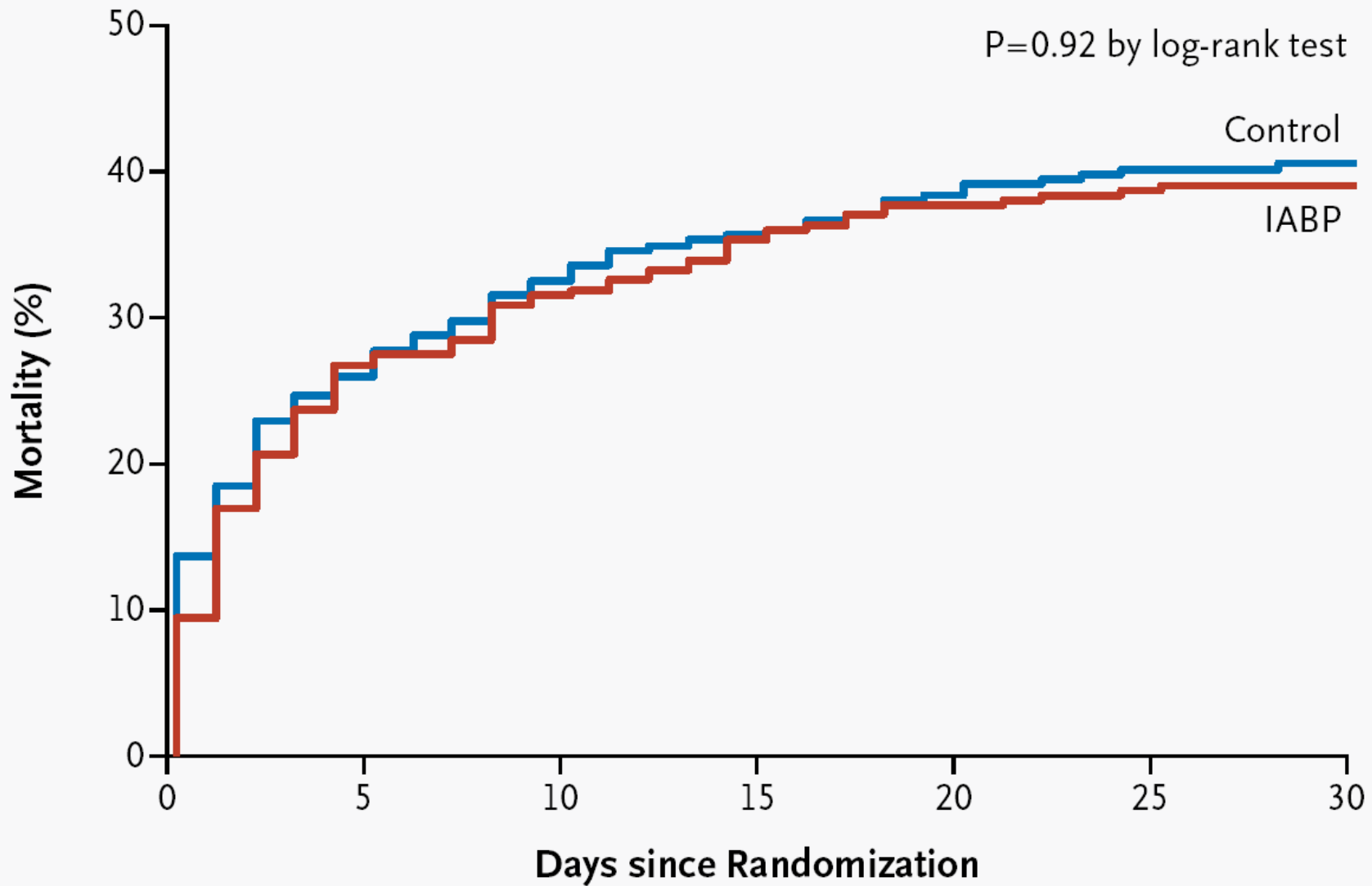


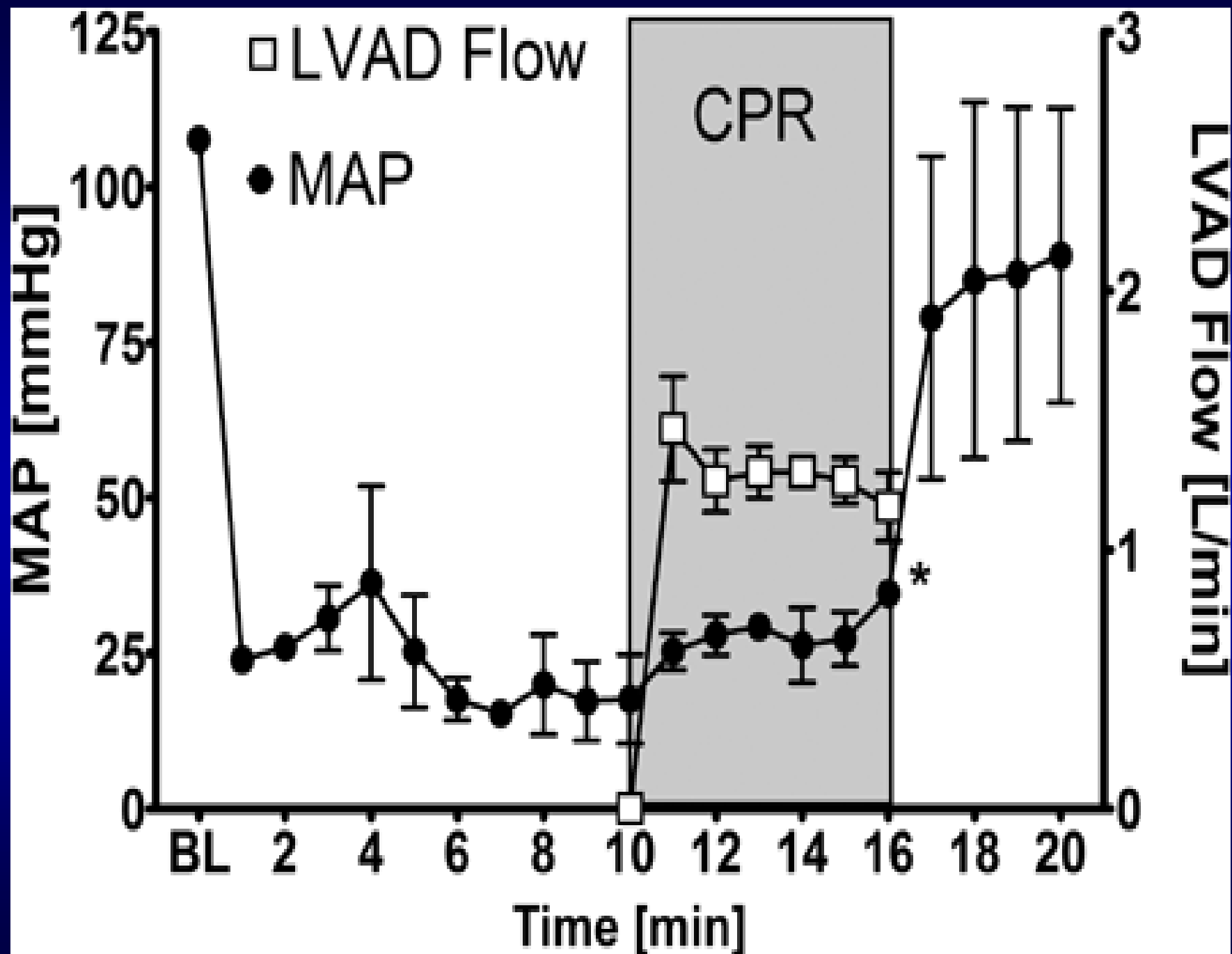
Gradient drives
coronary filling



Demystify the Misconceptions

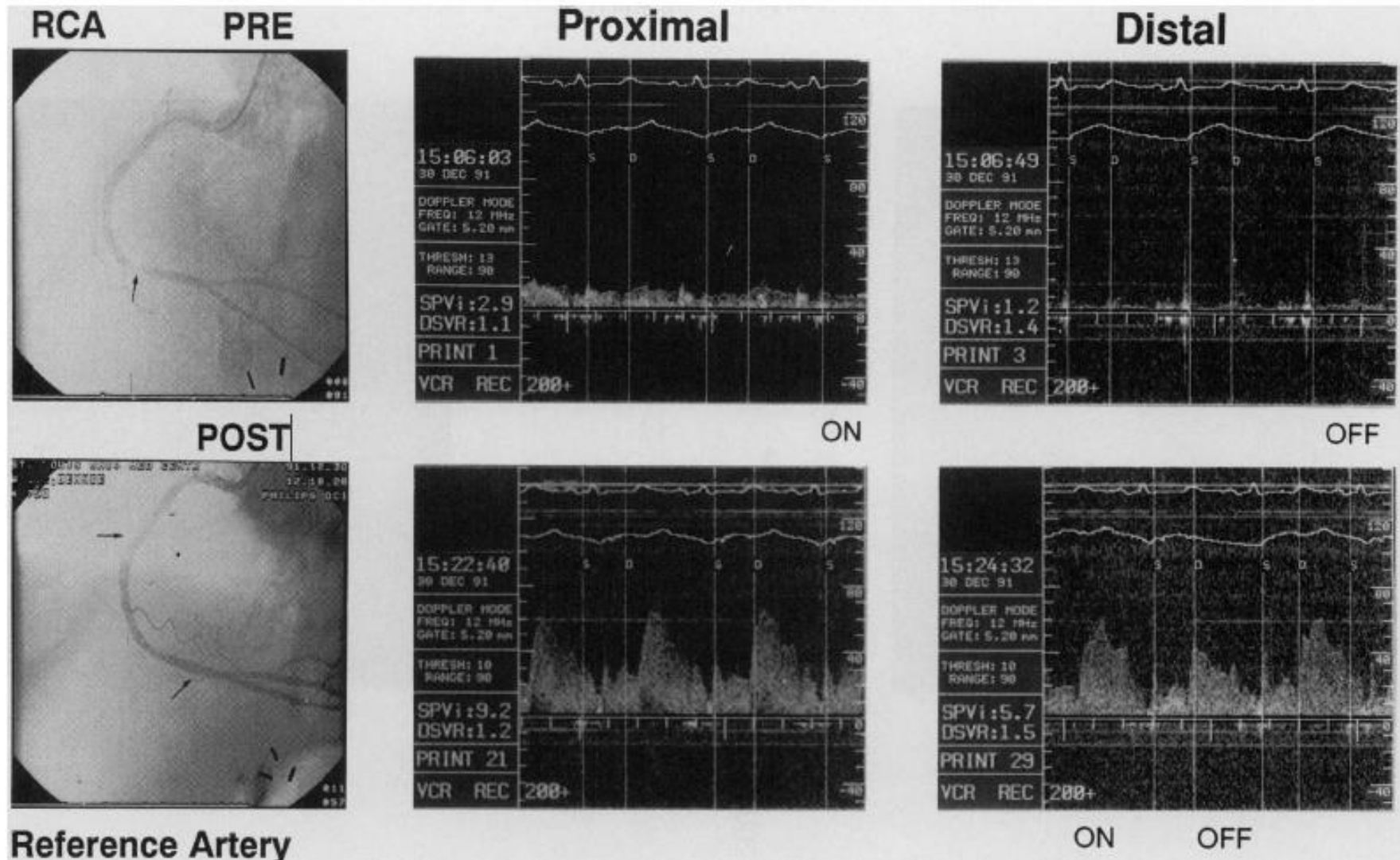
IABP- SHOCK II



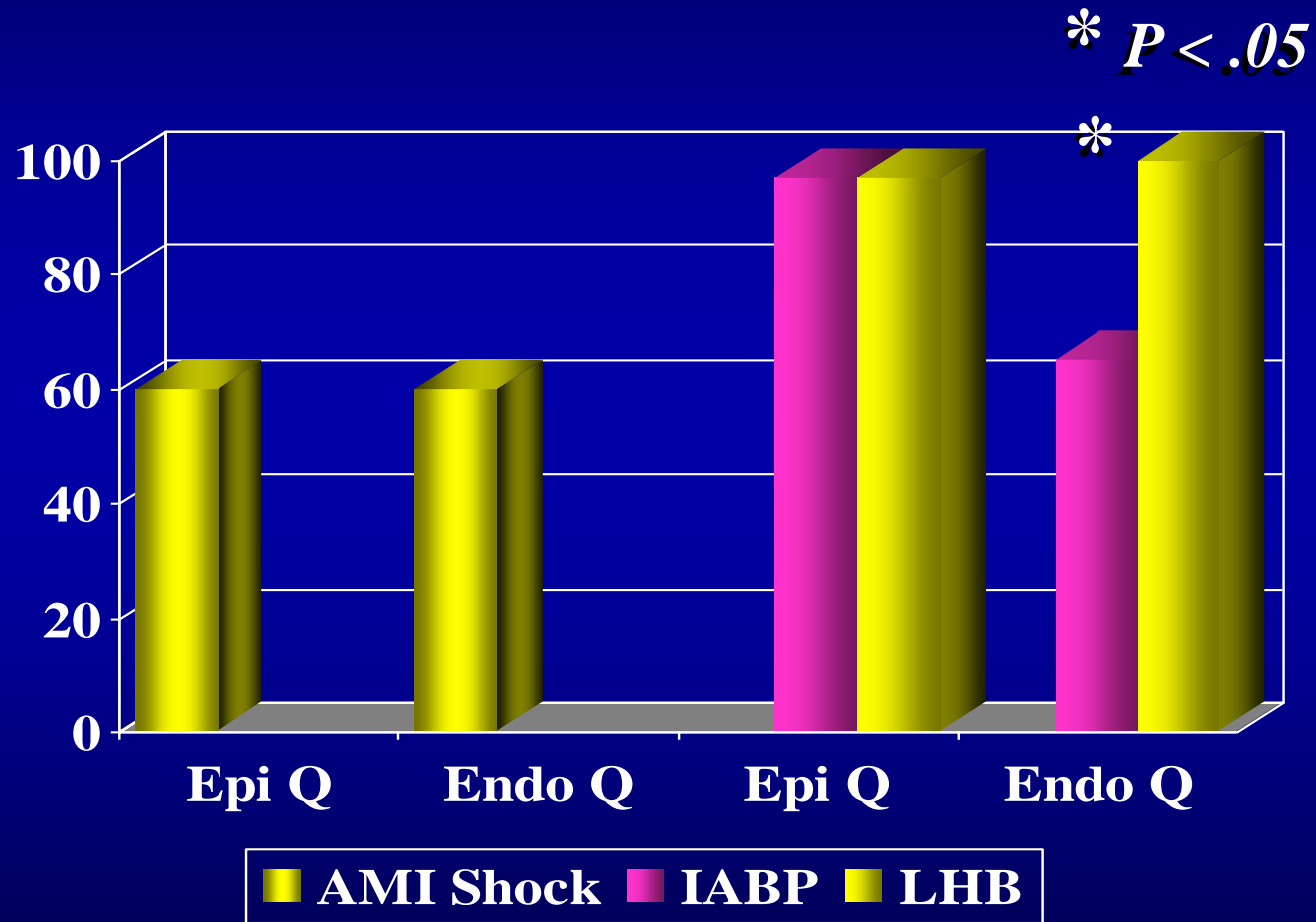


Does the IABP Help to Perfuse the Coronary Arteries?

Circulation 1993; 87:500-511



PIG MODEL CGS - LVAD vs IABP EFFECT on MICROCIRCULATION



Modified from Hata et al. Artificial Organs. 20(6); 1996:678-680

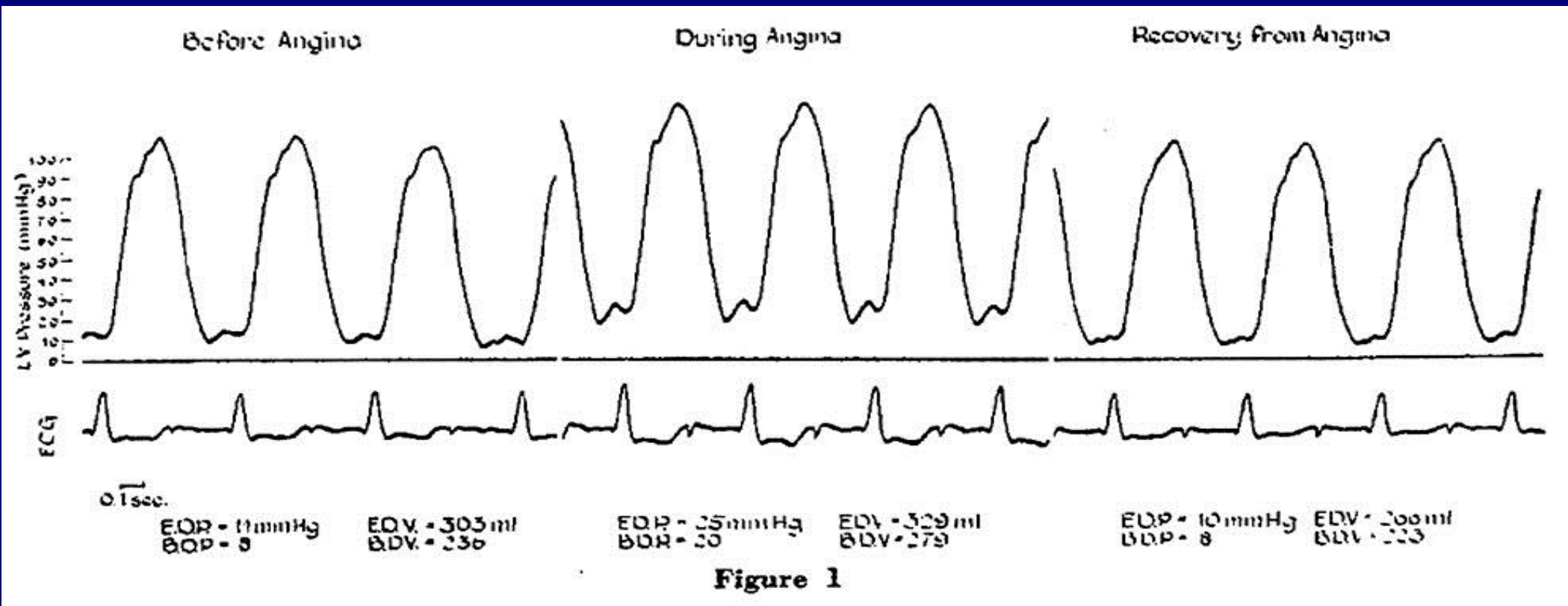
Conclusions

During PCI, blood pressure to be monitored,



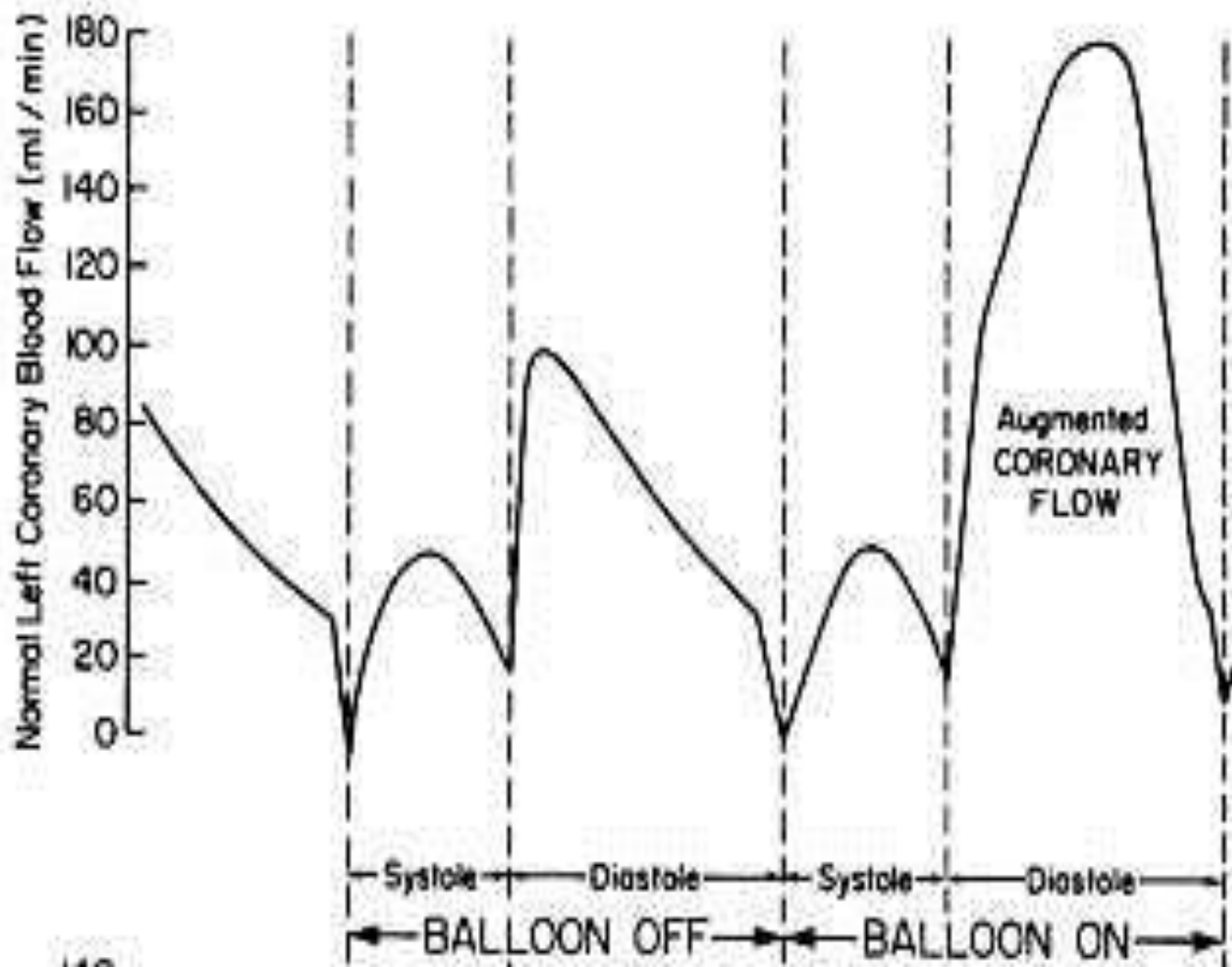
1. AOD
2. LVEDP

if LVEDP is good (<14mmHg), then the high LVEDP may not prevent perfusion of the endocardial layer of the myocardium



http://diastolicstresstest.com/?page_id=214

IABP could help



From: QRS Changes During Percutaneous Transluminal Coronary Angioplasty and Their Possible Mechanisms

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Figure Legend:

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Can Acute Diastolic Heart Failure Cause Ischemia?

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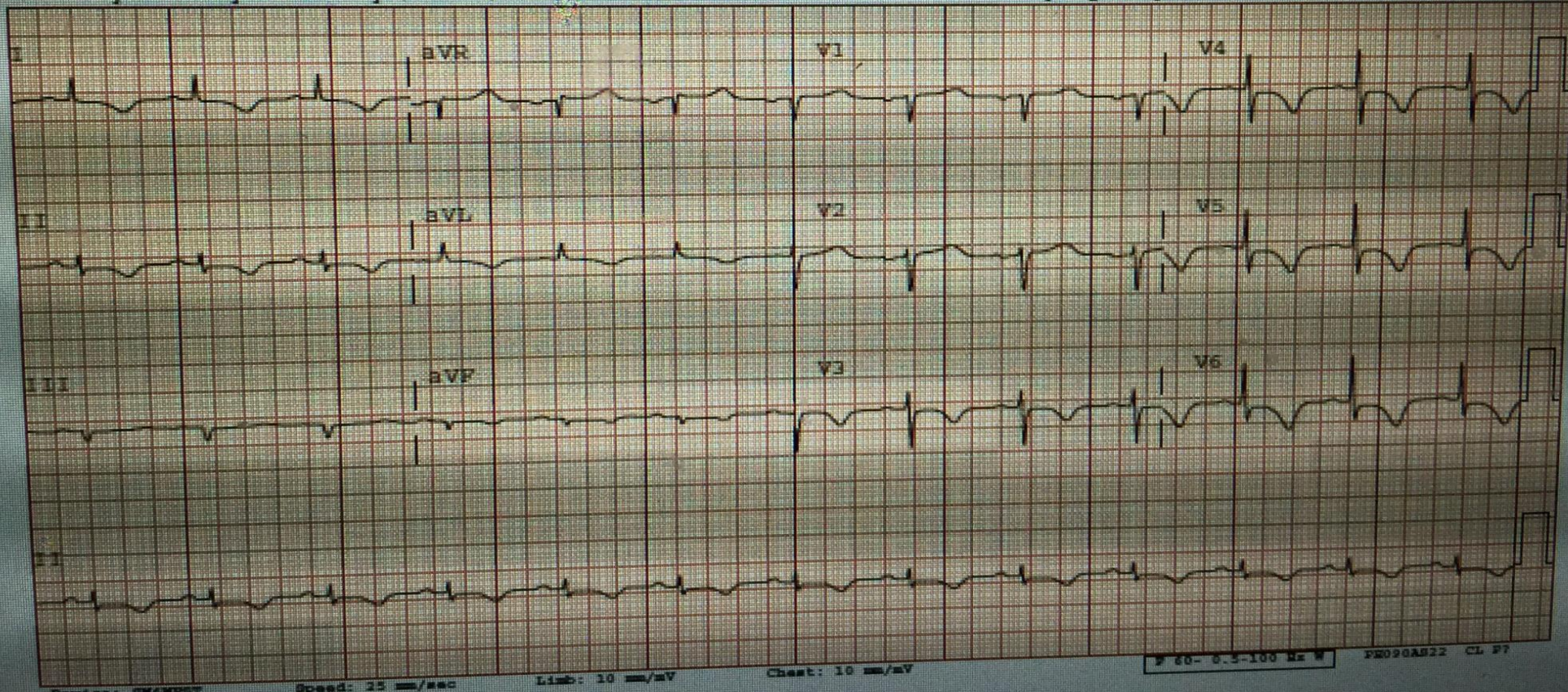
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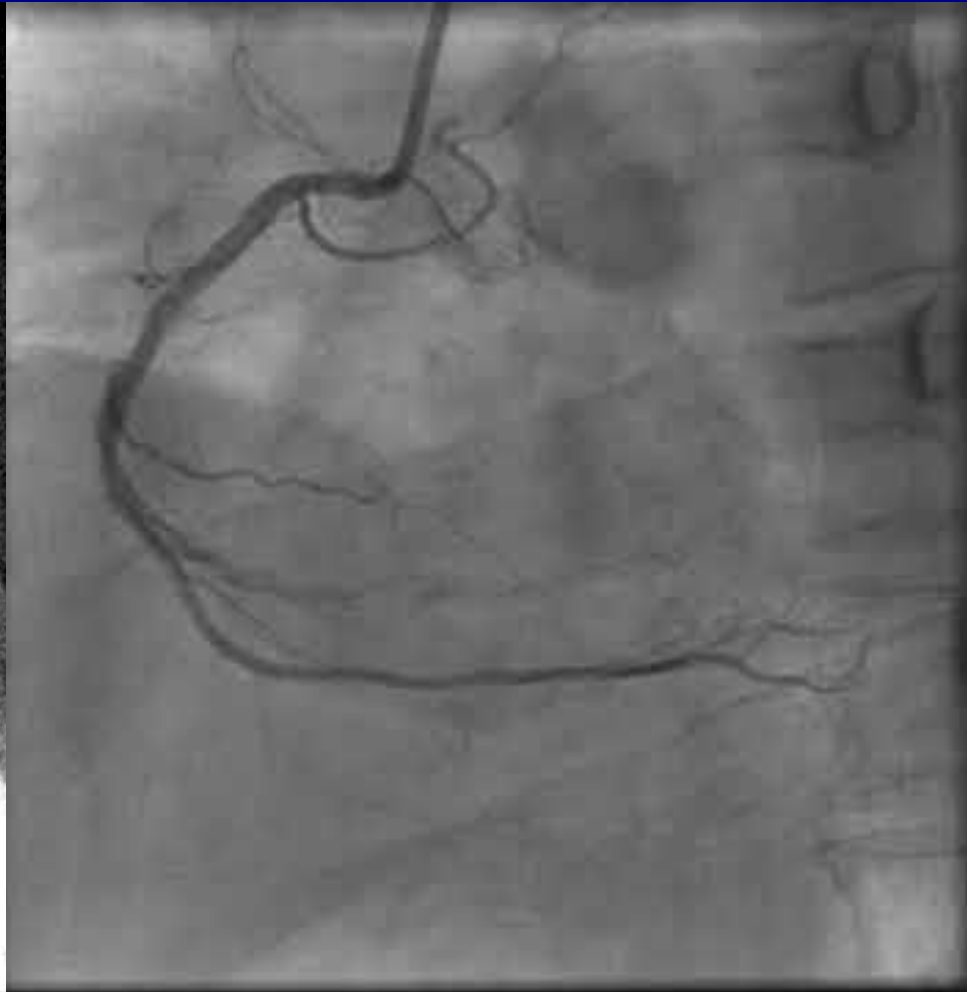
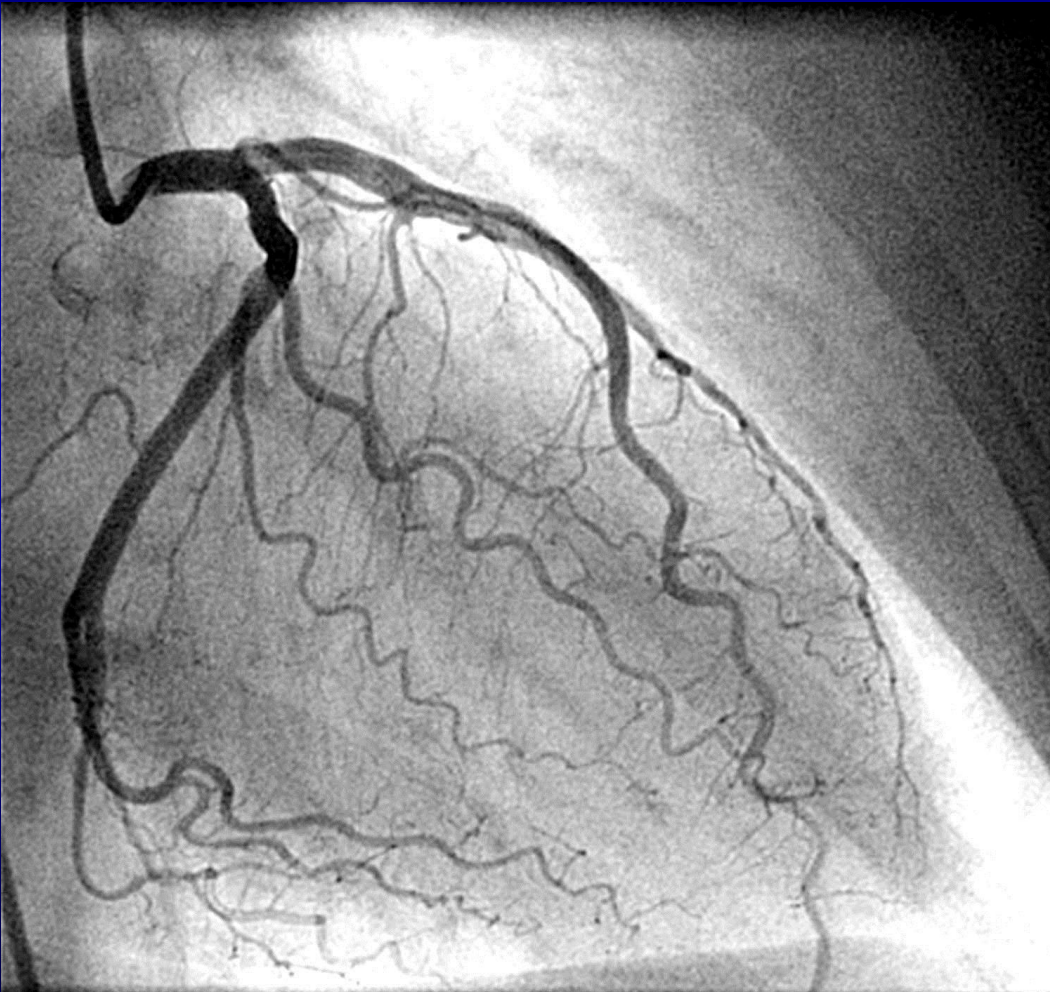
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Community Health Sys - St. Mary (1-02-09)



BP 77/52mmHg AOM= 60 mmHg LVEDP=38



Thank You

