Mulher de 61 anos com queixa de dor torácica e teste ergométrico positivo a baixa carga associado a dor precordial

Woman of 61 years, complaining of chest pain and positive treadmill exercise test at low load

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Final comment Andrés Ricardo Pérez-Riera M.D.Ph.D.

Mostra-se um traçado pertencente a uma mulher 61 anos durante o teste ergométrico.
A solicitação do exame tinha por objetivo investigação de dor torácica
Ecocardiograma normal.

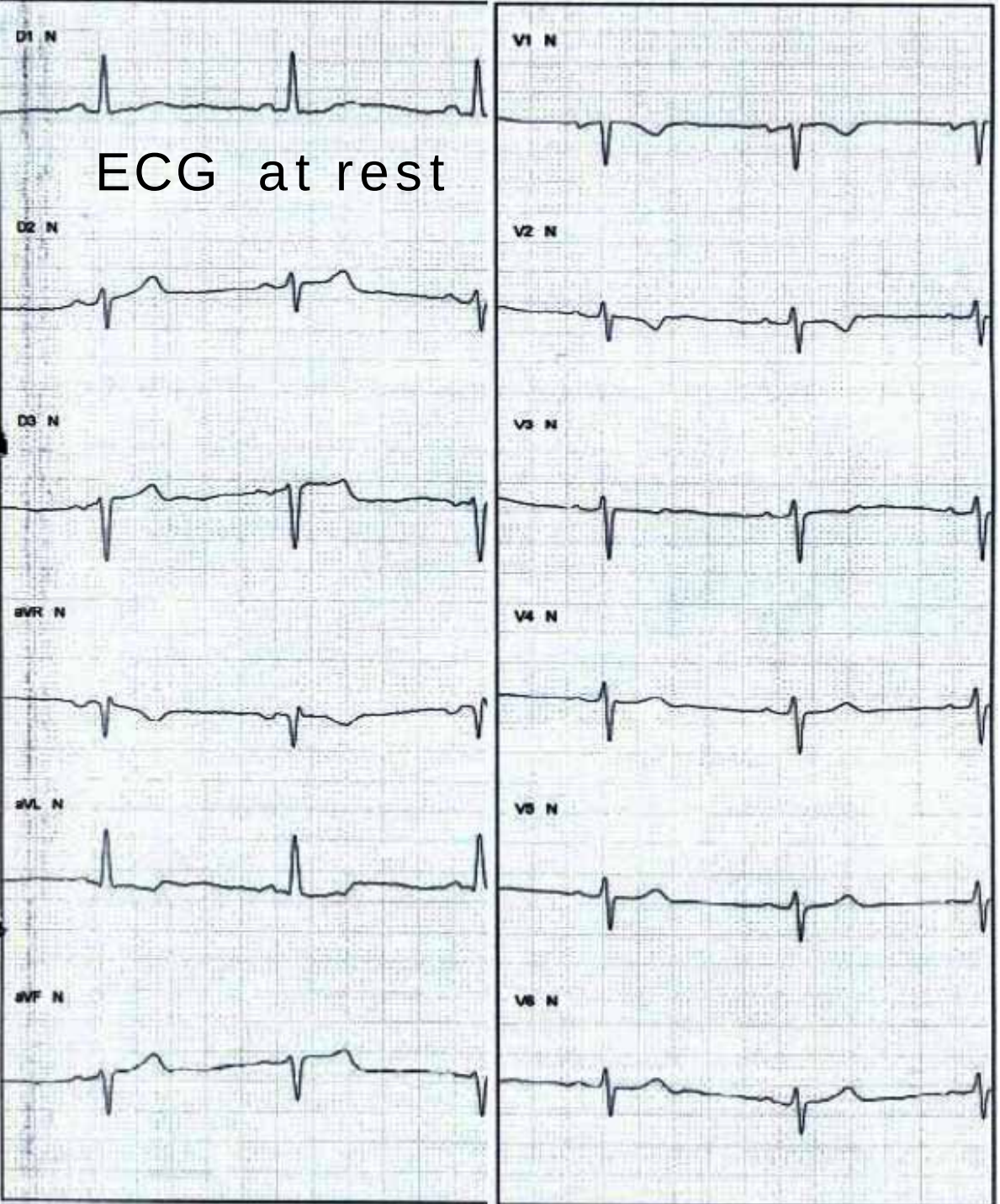
O que o ECG sugere?

Qual a conduta adequada?

It shows a belonging tracing to a woman 61 years of age during the Treadmill Exercise Test.
The exam solicitation had by objective investigation of chest pain

What does ECG suggest?

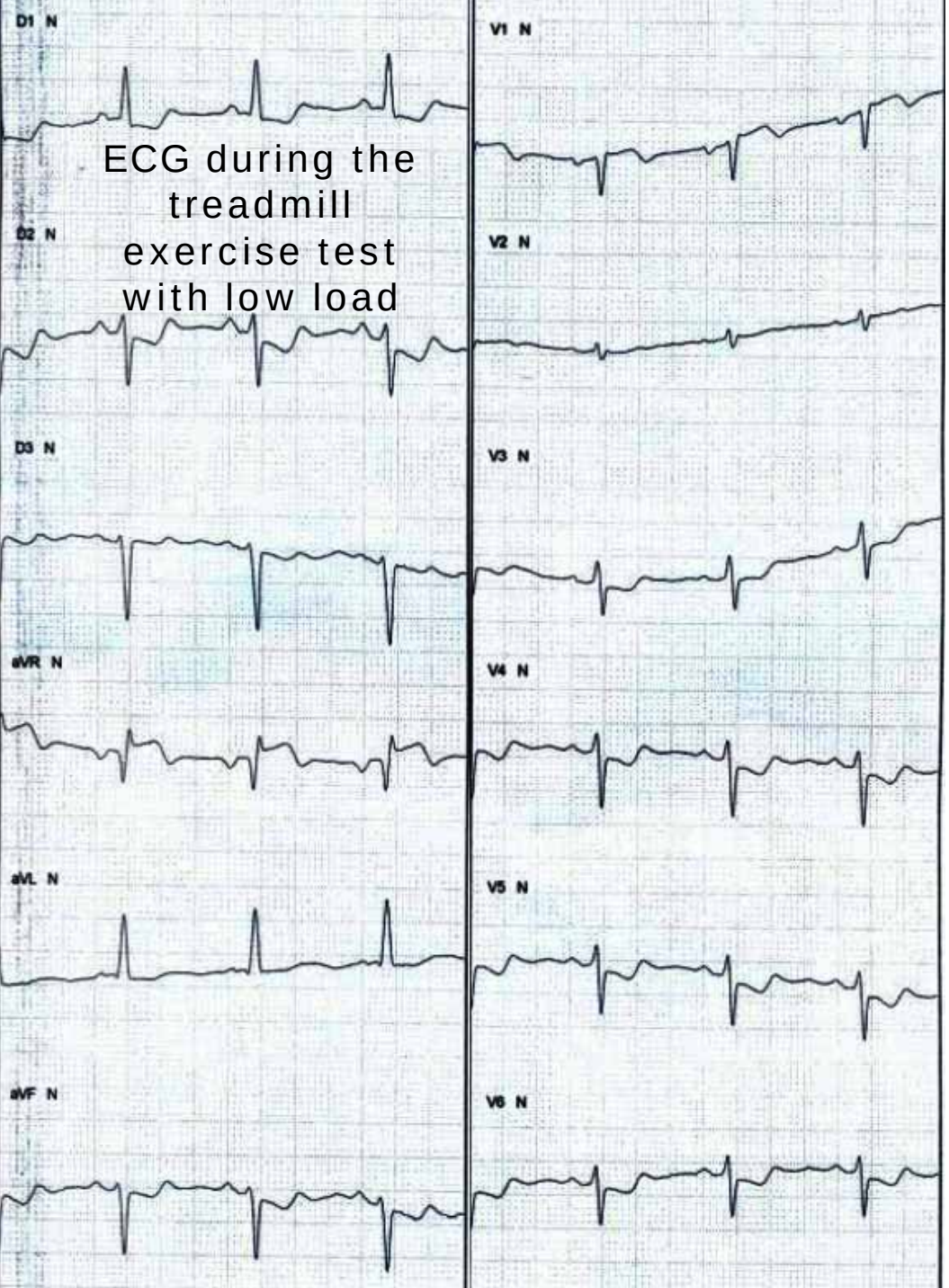
Which the adequate conduct?



Sinus rhythm, HR=53bpm, QRS axis with extreme left axis deviation (- 45º), rS pattern in inferior leads (SIII>SII) and from V_2 to V_6, dislocation to the left of the transition zone: normally it is in V3 and V4. In this case it is in V5 and V6. Voltage decrease of R wave and concomitant increase in S wave depth in V5 and V6, as a consequence of the superior dislocation of the forces: Left anterior fascicular block. LAFB Rosembaum´s type I or "standard" type characterized by:

SAQRS near –60º; q wave without s wave in I and no r' complex in II. S wave of III<15 mm, and tendency to isodipahsic QRS in aVR.

This variety of LAFB is the most frequent (50% of the cases).



Sinus rhythm, HR:78bpm, final deep and slow component of left atrium: left atrial enlargement **(LAE)** ≥ the area of one small square the final minus portion indicates LAE. P-Terminal Force (PTF-V1) exceeding 0,04mm/s. expressed as the multiple of its depth in millimeters and width in seconds (mm/s) in this case indicating elevated LV filling pressure.

LAFB: QRS axis -60º, rS patterm in inferior leads, transitional zone placed leftward and beyond lead V5, to left, and finals S waves in V5-V6,

Singnificative ST segment elevation in aVR with less ST segment elevation in lead V1. It is an important predictor of acute LMCA obstruction or ostial LAD stenosis. In addition ST segment depression from V_3 to V_6 and in II, aVF and I (Wide-spread ST depression)

Plus- minus T-wave in V_1. Inversion of the terminal portion of the T waves from V_2 to V_4 is indicative of so called "Wellens syndrome" associated with critical stenosis of the proximal LAD coronary artery.

COLLEAGUES OPINIONS

This is a interesting exercise. Her resting sinus rate is approximately 50 bpm. With a low level of exercise, she has impressive inferior-lateral wall ST depression along with ST elevation in aVR. I suspect a left dominant system with a proximal Circumflex lesion or the equivalent with multivessel disease. At this time, the patient's heart rate is only 75 bpm. Even though we were not told what, if any, medications she was on, there is not much room to either add negative chronotropic medications or increase those that may already be given. We were not told the status of her BP, her lipids or if she has diabetes and if any of these are present, they warrant being treated but that will not impact her acute management.

Based on the symptoms combined with this very positive stress test at a low level of exertion, I would refer her to cardiac catheterization with consideration for revascularization depending on the findings (either angioplasty and stent or CABG). If, with the stress test, she showed other signs of hemodynamic compromise such as a drop in BP and diaphoresis, I would admit her directly from the exercise lab to proceed to cardiac catheterization that same day or the next day. If her BP was stable and while she had CP and ST-T changes with the stress test, I would schedule an expeditious admission (in the next day or two) and advise the patient to markedly limit her activity until we could perform the catheterization. I would place her an aspirin a day (if she was not already taking it) and advise her to use sublingual TNG as soon as any discomfort begins.

Paul

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Este es un ejercicio interesante. En reposo el ritmo es sinusal con FC de 50 lpm. Con un bajo nivel de ejercicio, aparece un impresionante depresión del segmento ST infero-lateral y concomitante elevación del ST en aVR. Sospecho de obstrucción de un sistema izquierdo dominante con lesión proximal o el equivalente a la enfermedad de múltiples vasos. En este momento, la FC del paciente está a sólo 75 ppm. a pesar de que no se comentó los medicamentos que estaba haciendo uso, no hay mucho espacio para agregar.

No nos comentaron acerca de cual fue el comportamiento de su presión arterial, la taza lipidica o si tiene diabetes. Si cualquiera de estas co-morbidades están presentes merecen ser tratadas, pero este proceder no tendrá impacto en su tratamiento agudo.

Con base en los síntomas de dolor en el pecho en combinación con esta prueba de esfuerzo muy positiva en un nivel bajo de esfuerzo, yo la encaminaria a un cateterismo cardíaco con la consideración de revascularización en función de los resultados (ya sea con angioplastia y stent o con cirugía).

Si, durante la prueba de esfuerzo presentó otros signos de compromiso hemodinámico, como una caída en la presión arterial y sudoración, yo la encaminaria directamente desde el laboratorio de ejercicio para el cateterismo cardíaco en el mismo día o al día siguiente. Si su presión arterial se mantuvo estable, al mismo tiempo, me gustaría hacer una entrada rápida (al día siguiente o dos) y aconsejar al paciente que limite bastante su actividad, y hasta que pudieramos realizar el cateterismo. Yo le daria una aspirina diariament (si no es que ya la tomaba) y le aconsejaria que utilice nitrato sublingual tan pronto como sienta cualquier molestia o dolor precordial.

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Estimados Raimundo y Maestro Andrés.
El ECG basal presenta desviación del eje eléctrico a la izquierda, supradesnivel del segmento ST en DIII y aVF de1 de mm y T positiva simétrica, T negativa en V1 y V2 y ondas T simétricas de V4 a V6. En la ergometria, como refieren a baja carga presenta positivización de ondas T en V1 y V2 con supradesnivel del segmento ST en V1, t ambién aVL pseudopositiviza la onda, y presenta injuria subendocardica de V3 a V6 y DII y aVF. con supradesnivel del ST en aVR.
No refieren si presentó disnea o angor en la misma.

1. Los cambios electrocardiográficos ocurridos a baja carga indican lesión de tronco de de la coronaria izquierda, o de una descendente anterior y circunfleja.
2. Con el antecedente de angor, me inclinaria por evaluar la anatomía coronaria mediante una cinecoronariografia.

Un cordial saludo
Martin Ibarrola MD Argentina

Dear Raimundo and Master Andrés.
The baseline ECG shows the QRS electrical axis deviation to the left, ST segment elevation in II and aVF (1mm) followed by a symmetric positive T wave, negative T-wave in V1 and V2 and symmetrical T waves from V4 to V6.
During the ergometry, as concern wiht low load she had positivization of T-wave in V1 and V2 with ST segment elevation in V1, the T-wave also had pseudopositivizaton, and presented subendocardial injury from V3 to V6 and II and aVF with concomitant ST elevation in aVR.
No comments if she had shortness of breath and / or chest pain during exercise.

1. Electrocardiographic changes occurred at low loads indicate LMCA obstruction or a left anterior descending (LAD) and left circumflex(LCX) in association.
2. With a positive history of angina during excercice, I would go for assessing coronary anatomy by angiography.

Regards
Martin Ibarrola

Saludos rompo el silencio para agradecer los debates que son muy nuestros, muy latinos y muestran que el hombre que sabe reir en los debates analiza mejor.
A la paciente aun en ausencia de dolor le hubiese recomendado al mèdico tratante una coronariografìa al pensar en lesión multivaso o de TCI
Serà otra cosa y aprenderè pero siempre actuaría igual

Rolando Rogès
Cuba

Greetings break the silence to give thanks for our discussions are very, very Latin and show that the man who can laugh best analyzed in the discussion.
The patient even in the absence of pain I had recommended to the attending physician a coronariography because I think in multivessel or LMCA obstruction.
Be something else and learn but always act the same.

Parece ser una mujer que en el ECG en reposo muestra un ritmo sinusal, hemibloqueo anterior izquierdo y trastornos inespecíficos de la repolarización en cara anterior.

Con el esfuerzo presenta isquemia muy difusa en todo su ECG o tiene hipertrófia ventricular importante (que no parece corroborarlo el ECG basal) o una severa obstrucción del tronco de la coronaria izquierda.

Estimo habría que realizarle un ecocardiograma y posiblemente una cinecoronariografía.
Saludos a los colegas del Foro
Jose Luis Serra
Córdoba- Argentina

It seems to be a woman in resting ECG shows sinus rhythm, left anterior hemiblock and nonspecific repolarization disturbances in the anterior wall.

With the effort too diffuse ischemia throughout their ECG or important ventricular hypertrophy (which does not seem to corroborate the baseline ECG) or severe obstruction of the left main coronary artery.

I believe should have an echocardiogram and possibly a coronary angiography.
Greetings to the Forum colleagues
Jose Luis Serra M D

Cordoba, Argentina

Amigos do Forum e Prof. El POTRO(Phd) and The Fox(Irei em agosto no Congresso):

ECG de repouso:

FC = 53 bpm

Duração do P = 0,08" PR = 0,20" Duraçâo do QRS = 0,06"

EIXOS: SÂQRS = -45º(SII<SIII) SÂP = + 30º SÂT = 60º

Comentários:

1) Eixo desviado a esquerda SII <SIII
2) ST retificado com Onda T aplanadas DI, aVL e provável supra de ST em DIII e aVF
3) Onda T invertida V_1 a V_3
4) R sem progressão(amputación) nas precordiais
5) Onda S V4 – V5

Impressão:

Bloqueio Fascicular Ântero Súpero-Esquerdo

Fibrose de parede anterior - Sugestivo de Doença Coronária

ECG no esforço:

Isquemia subendocárdica circunferencial aguda em carga baixa SEM ELEVAÇÃO DE FREQUENCIA CARDÍACA

Conduta: CATETERISMO CORONÁRIO que determinará conduta: Cirúrgica? ICP? O ECG sugere lesão coronária de tronco ou multipla DA+CD +Cx

Adail =- Bahia- Brasil

Queridos amigos del forum otra vez discutiremos los transtornos electrocardiográficos de la mujer post-menopáusica
ECG de reposo:
Desvio del eje a la izquierda alrededor de – 30º muy frecuente en mujeres hipertensas o con isquemia crónica por disminución en la concentración de conexina 43, que reduce en un 50% la velocidad de conducción en la cara anterior.
La hipertensión perssistente crónica, la isquemia crónica y la diabetes reducen estas proteinas adesivas en la cara anterior
Ondas T mas altas en III que I, en un corazón horizontal
Ondas T invertidas en aVL y en V2 causada mas frecuentemente por obstrucción crónica de una arteria primera diagonal, que produjo un infarto no transmural en la base cardiaca (este es un diagnóstico unicamente electrocardiográfico) En este caso yo diria con certeza que este es obstrucción crónica de la *primera* diagonal(1rs diagonal) y muy probable obstrucción no completa de la descendente anterior
La ergometria muestra una isquemia circunferencial subendocárdica a baja FC, sugeriendo una obstrucción critica de la LMCA o severa de tres vasos La depresión circunferencial del ST induce a un aumento brusco de la presión diastólica final del VI lo que explica que estos pacientes el dolor vaya acompañado de disnea severa, y a veces disnea paroxística nocturna.
Conducta: encaminaria directamente al laboratório de hemodinamia. Es candidata para cirugia de revascularización (CABG).No creo que haya lugar para diagnóstico diferencial ,
Comentário: en mujeres menopáusias sin enfermedad coronaria es frecuente observar ST-T deprimido durante la prueba de esfuerzo, debido a una deficiencia de la relajación diastólica denominado sindrome X de la mujer menopáusica.

Un fraternal abrazo
Samuel Sclarovsky

Thank you for an interesting case. ECG at rest is pathological with left frontal axis, ST elevations in II, III, aVF and ST depressions in V2-V3 and aVL. We would probably not perform an exercise test in this patient without an echocardiography if we did not have a previous ECG with the same pathological changes. The ECG may even indicate inferolateral transmural ischemia.
During the exercise test the patient develops signs of severe coronary artery disease, even left main stenosis or tight proximal LAD stenosis: ST elevations about 2 mm in aVR, less in V1 and wide-spread ST depression. Also there is a PTF indicating elevated filling pressure of the left ventricle.
Kjell Nikus
Tampere, Finland

Gracias por un caso interesante. ECG en reposo es patológico por el eje frontal izquierdo, la elevación de ST en II, III, aVF y depresión del segmento ST en V2-V3 y aVL. Nosotros probablemente no realizariamos una prueba de esfuerzo en esta paciente, sin un ecocardiograma si no tiene un ECG anterior con los cambios patológicos mismo. El ECG puede incluso indicar isquemia transmural inferolateral.
Durante la prueba de esfuerzo la paciente desarrolla signos indicativos de la enfermedad coronaria severa: estenosis de un tronco de coronária izquierda o una DA proximal por la elevacion del segmento ST de 2 mm en aVR, menos en V1 y la difusa depresión del ST. También hay fuerzas terminales de P en V1 que indican aumento de la presión de llenado del ventrículo izquierdo.

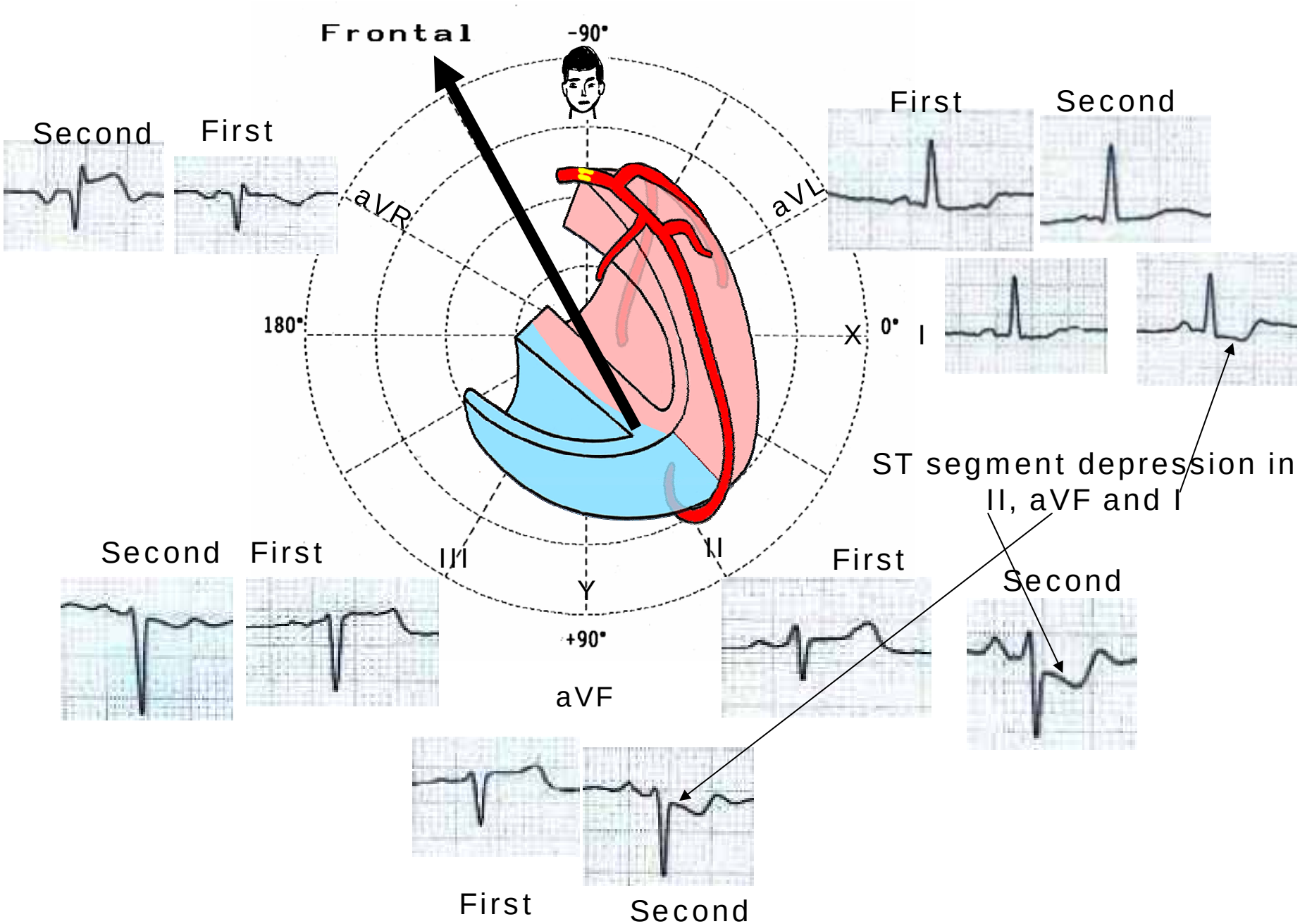
Kjell Nikus

Tampere, Finlandia

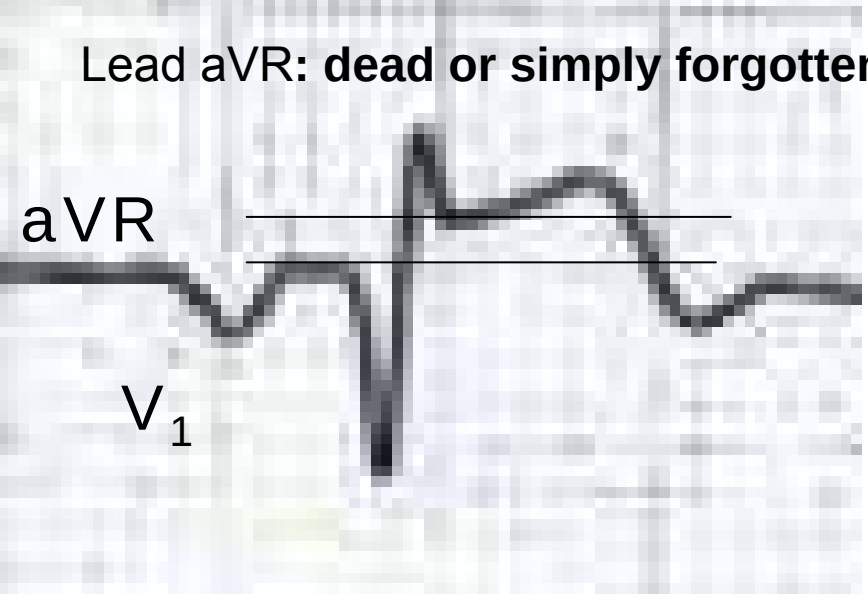
FINAL COMMENTS

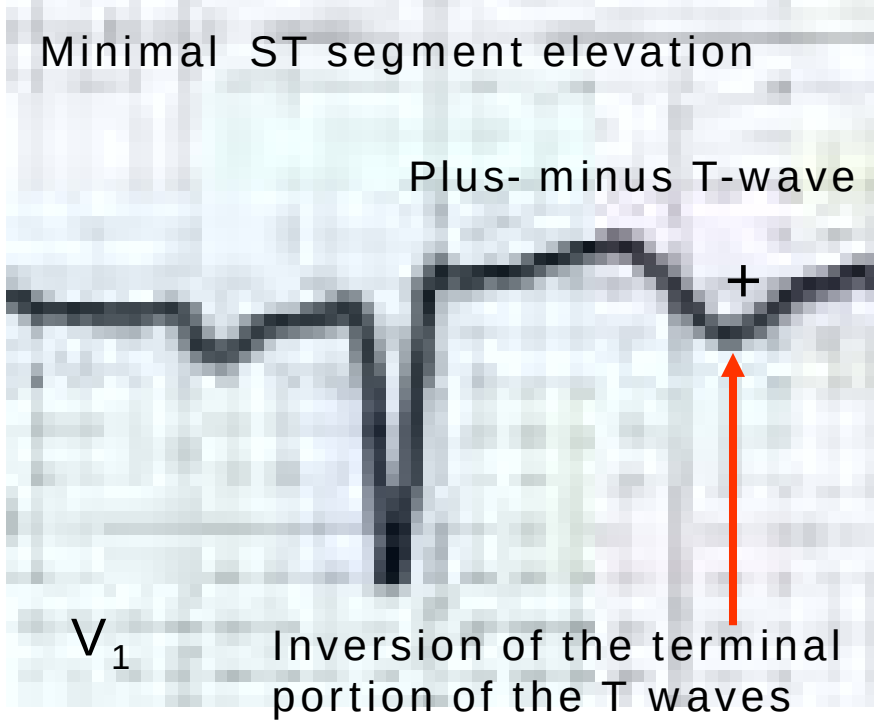
By Andrés Ricardo Pérez-Riera M.D. Ph.D.

INJURY VECTOR UPWARD AND TO RIGHT (CLOSE TO aVR)



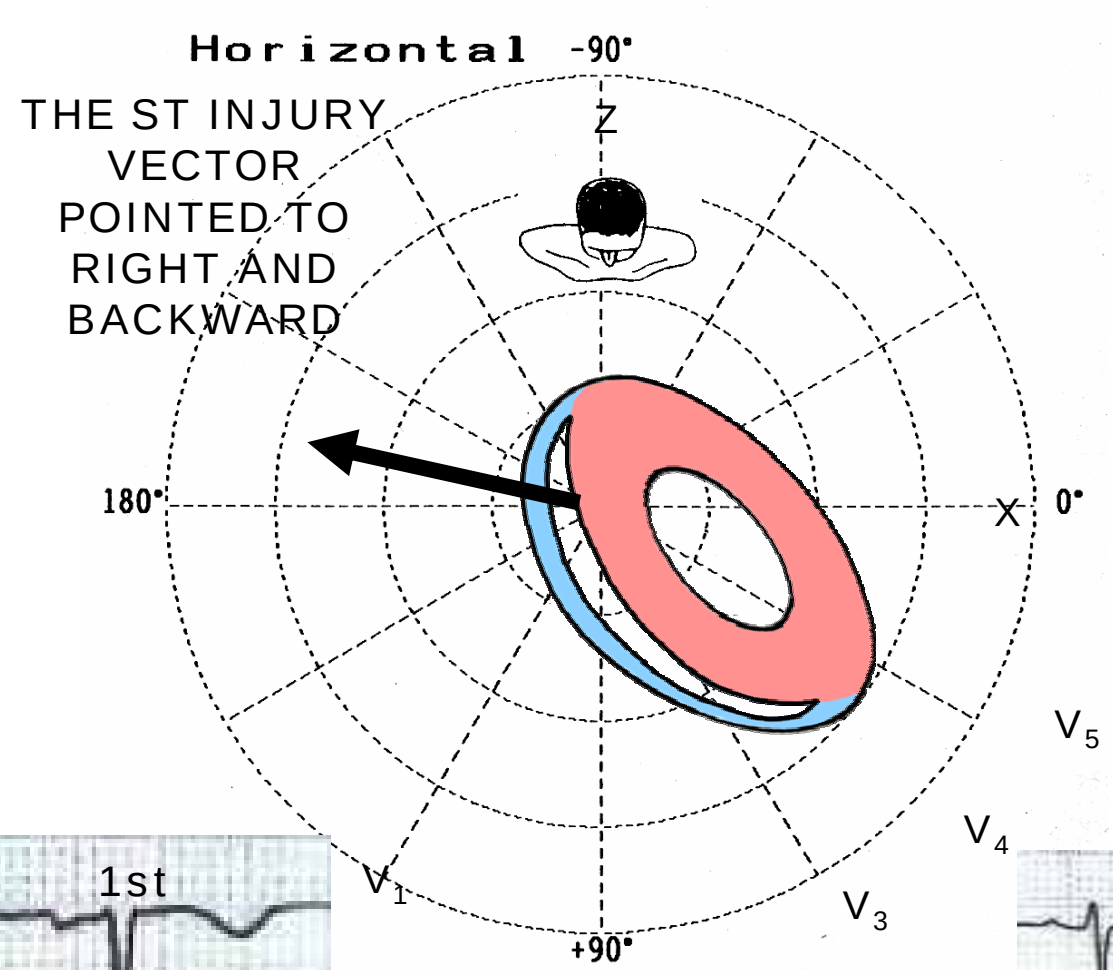
Lead aVR: **dead or simply forgotten?**





Stress exercise treadmill testing (ETT)-induced STE in lead aVR is an important indicator of significant LMCA or ostial LAD stenosis and should not be ignored. Although additional electrocardiographic, stress test, and single photon-emission computed tomographic myocardial perfusion imaging (MPI) variables were significant univariate predictors, none was statistically significant in multivariate analysis. At 1-mm STE in lead aVR, sensitivity for LMCA or ostial LAD stenosis was 75%, specificity was 81%, overall predictive accuracy was 80%, and post-test probability increased nearly 3 times from 17% to 45%. (1)

1. Uthamalingam S, Zheng H, Leavitt M, et al. Exercise-induced ST-segment elevation in ECG lead aVR is a useful indicator of significant left main or ostial LAD coronary artery stenosis. JACC Cardiovasc Imaging. 2011 Feb;4:176-186.
2. Vorobiof G, Ellestad MH. Lead aVR: dead or simply forgotten? JACC Cardiovasc Imaging. 2011 Feb;4:187-190



THE ST INJURY VECTOR POINTED TO RIGHT AND BACKWARD

1st

2nd

Inversion of the terminal portion of the T waves

1st

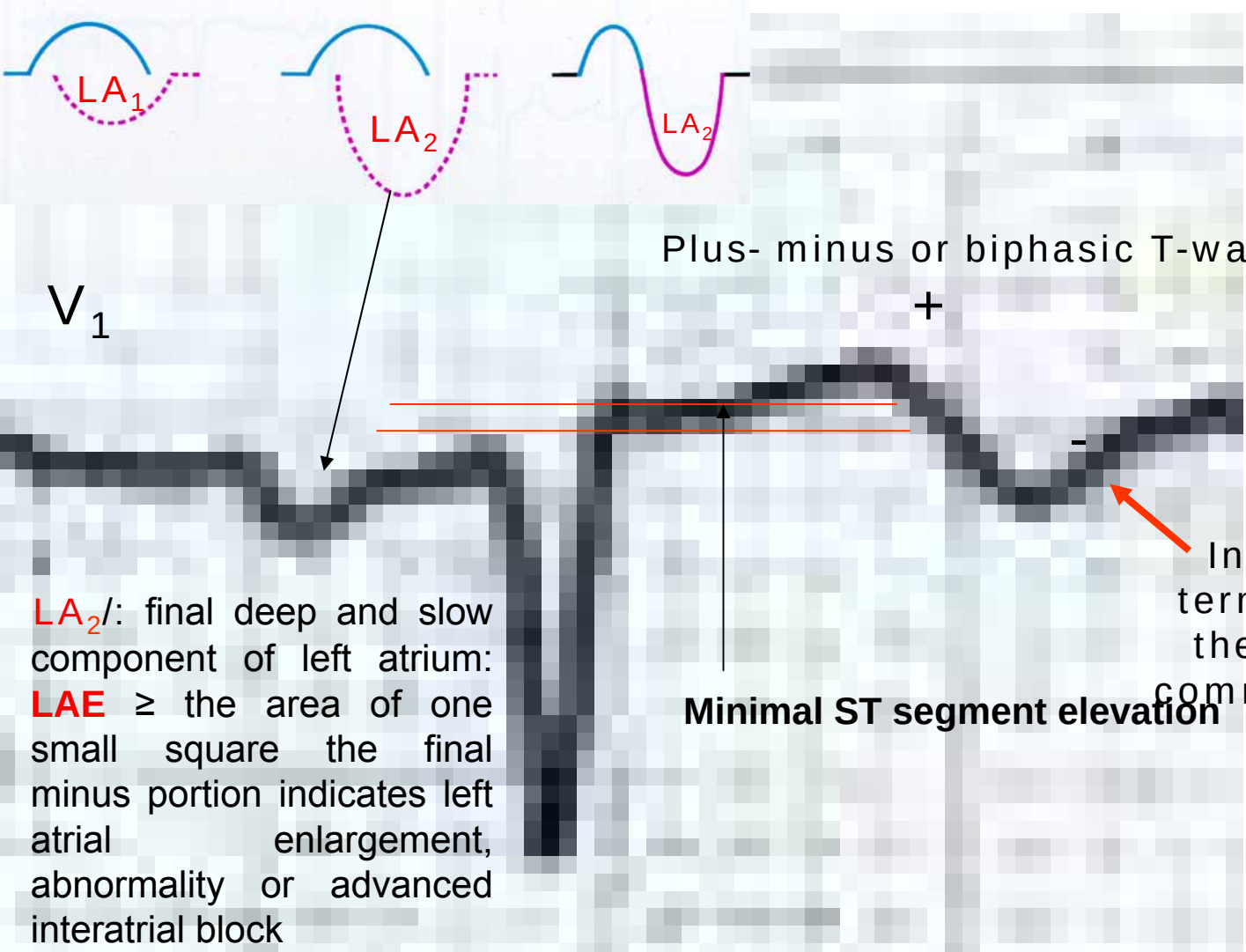
2nd

Wide-spread ST depression

ST depression of the segment from V_3 to V_6

+

ST segment depression in II, aVF and I



P-Terminal Force (PTF-V_1) exceeding 0,04mm/s. expressed as the multiple of its depth in millimeters and width in seconds (mm/s) in this case indicating elevated LV filling pressure. This > of PTF-V1 was described 48 years ago by Morris (Morris' index) 1

1. **Morris JJ Jr, Estes EH Jr, Whalen RE, Thompson HK Jr, Mcintosh HD. P-WAVE ANALYSIS IN VALVULAR HEART DISEASE. Circulation. 1964 Feb;29:242-252.**

#

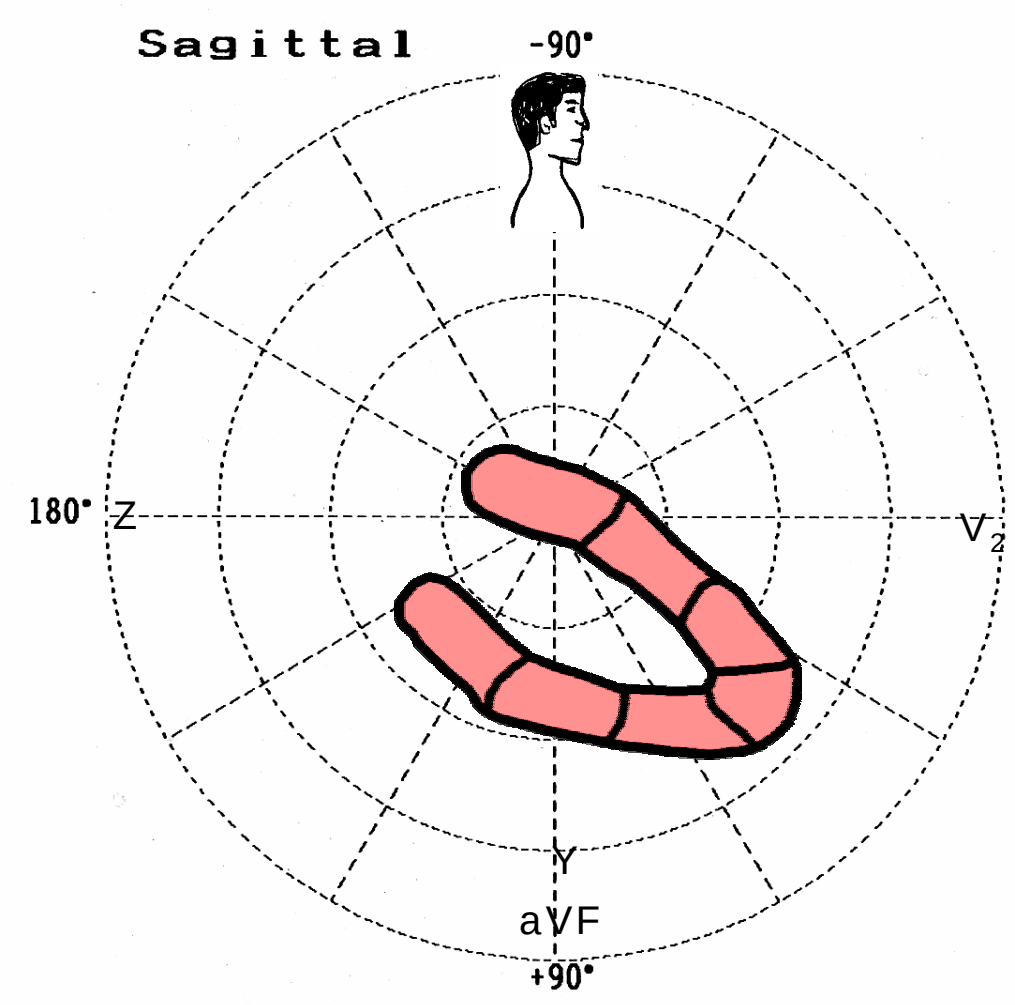
Wellens syndrome is also referred to as LAD coronary T-wave syndrome.(1) Syndrome criteria include characteristic T-wave changes; a history of anginal chest pain; normal or minimally elevated cardiac enzyme levels; and finally an ECG without Q waves, without significant ST elevation, and normal precordial R-wave progression. We described by the first time Wellens syndrome associated with prominent anterior QRS forces as expression of left septal fascicular block(2) Recognition of this ECG abnormality is of paramount importance because this syndrome represents a preinfarction stage of coronary artery disease that often progresses to a devastating anterior wall infarction. In this ECG pattern, there is significant involvement of the T-wave, with minimal ST-segment alteration. The ST segments themselves are usually isoelectric, but, if abnormal, there will be less than 1 mm of elevations with a high take off of the ST segment from the QRS complex. The characteristic changes of this electrocardiographic syndrome occur in the T-wave and occur in 2 forms. The more common form, which occurs 76% of the time, is deep inversion of the T-wave segment in the precordial leads.(3) The ST segment will be straight or concave, and pass into a deep negative T wave at an angle of 60-90 degrees. The T wave is symmetric. In Wellens syndrome, these changes generally occur in leads V1 -V4 but may also occasionally involve V5 and V6. V1 is involved in approximately 66% of patients and lead V4 nearly 75% of the time.(4) See the ECG images below. The less common variant of Wellens syndrome, which occurs in 24% of patients, consists of biphasic T waves, most commonly in leads V2 and V3 but also can include V1-V5/V6.(5)

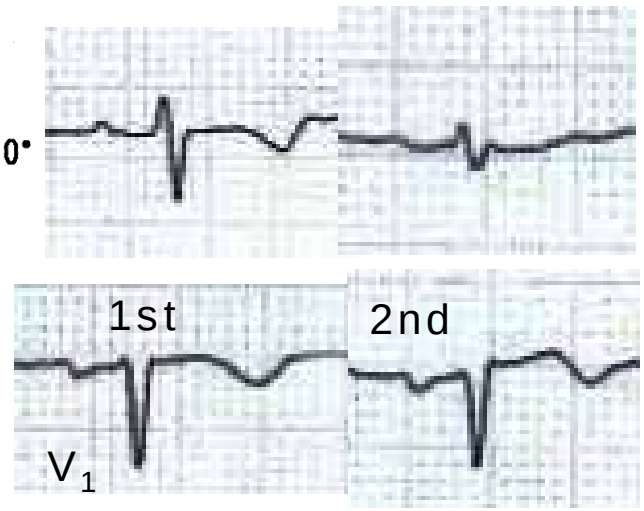
1. **Nisbet BC, Zlupko G. Repeat Wellens' Syndrome: Case Report of Critical Proximal Left Anterior Descending Artery Restenosis. *J Emerg Med*. Apr 2 2008;**
2. **Riera AR, Ferreira C, Ferreira Filho C, et al. Wellens syndrome associated with prominent anterior QRS forces: an expression of left septal fascicular block? J Electrocardiol. 2008 Nov-Dec;41:671-744**
3. **Tandy TK, Bottomy DP, Lewis JG. Wellens' syndrome. *Ann Emerg Med*. Mar 1999;33:347-51.**
4. **Rhinehardt J, Brady WJ, Perron AD, Mattu A. Electrocardiographic manifestations of Wellens' syndrome. *Am J Emerg Med*. Nov 2002;20:638-643.**
5. **de Zwaan C, Bar FW, Janssen JH, et al. Angiographic and clinical characteristics of patients with unstable angina showing an ECG pattern indicating critical narrowing of the proximal LAD coronary artery. *Am Heart J*. Mar 1989;117:657-665.**

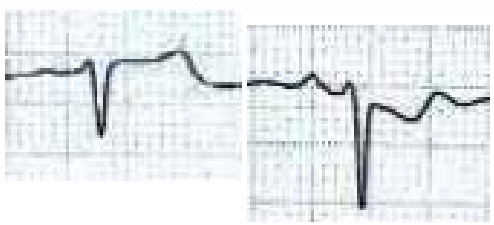
ECG CRITERIA OF LMCA OCCLUSION

1. **ST segment elevation in aVR, and V_1 Lead aVR ST segment elevation with less ST segment elevation in lead V1 is an important predictor of acute LMCA obstruction.**
2. **Lead aVR ST segment elevation with less ST segment elevation in lead V(1) is an important predictor of acute LMCA obstruction. (1)**
3. **Ischemic evidences in inferobasal wall: depression of the ST segment in II and from V4 to V5**
4. **ST segment depression in II or in inferior leads II>III**
5. **Depression of ST segment in V6 > ST segment elevation in V_1**
6. **Diffuse ST segment depression in the inferolateral leads widespread ST segment depression(2) especially in leads V4-V6 with inverted T waves or ST elevation involving the anterior precordial leads and the lateral extremity leads I and aVL.**(3)
7. **Eventually observation of RBBB, LAFB and/or LSFB.**

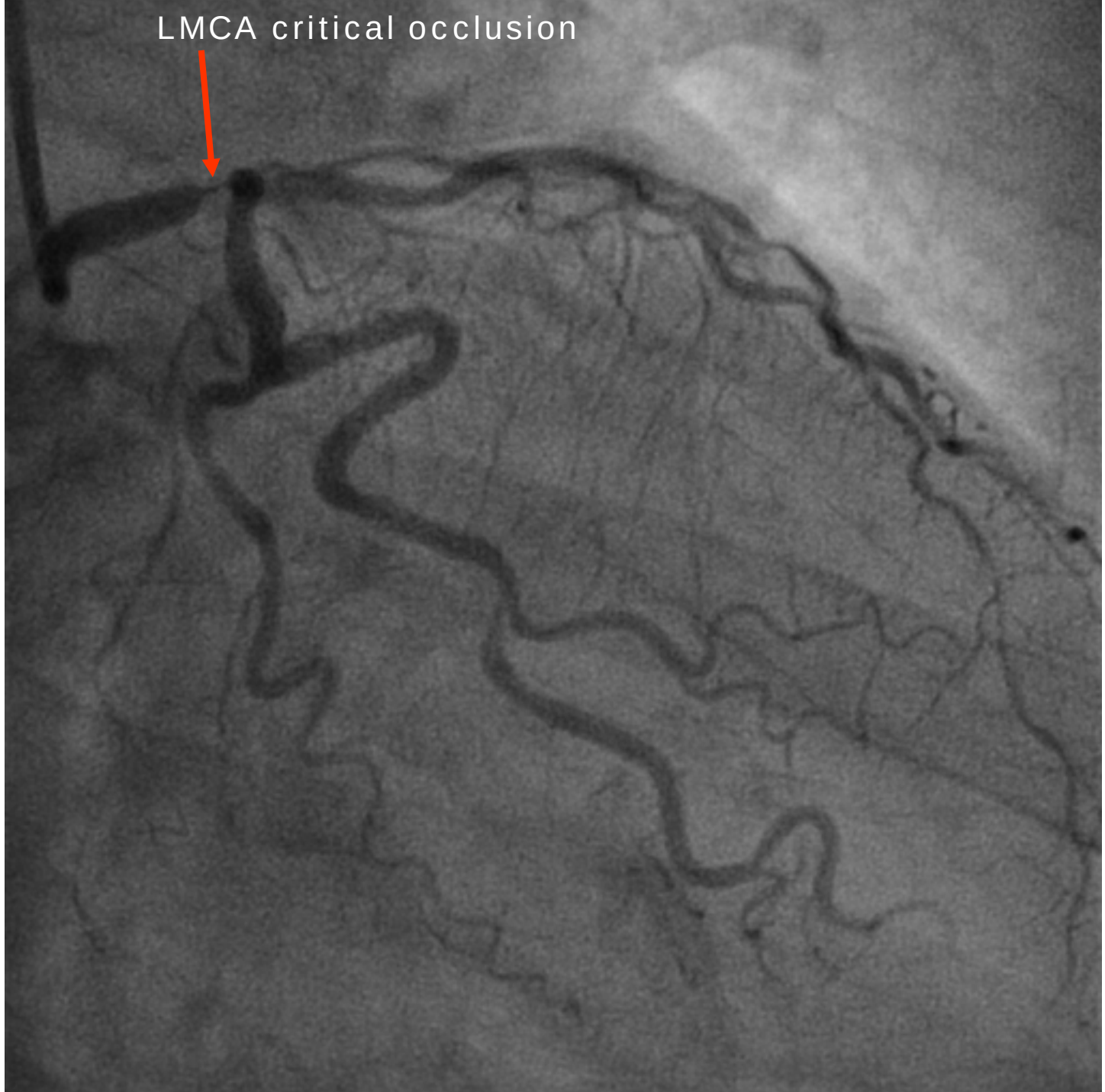
1. Yamaji H, Iwasaki K, Kusachi S, et al. Prediction of acute left main coronary artery obstruction by 12-lead electrocardiography. ST segment elevation in lead aVR with less ST segment elevation in lead V(1). J Am Coll Cardiol. 2001 Nov 1;38:1348-1354.
2. Liang M, Kelly DJ, Devlin G. Left main stem stenosis in the unstable patient--forewarned is forearmed. N Z Med J. 2011 Jul 8;124:111-113.
3. Nikus KC, Eskola MJ. Electrocardiogram patterns in acute left main coronary artery occlusion. J Electrocardiol. 2008 Nov-Dec;41:626-629.



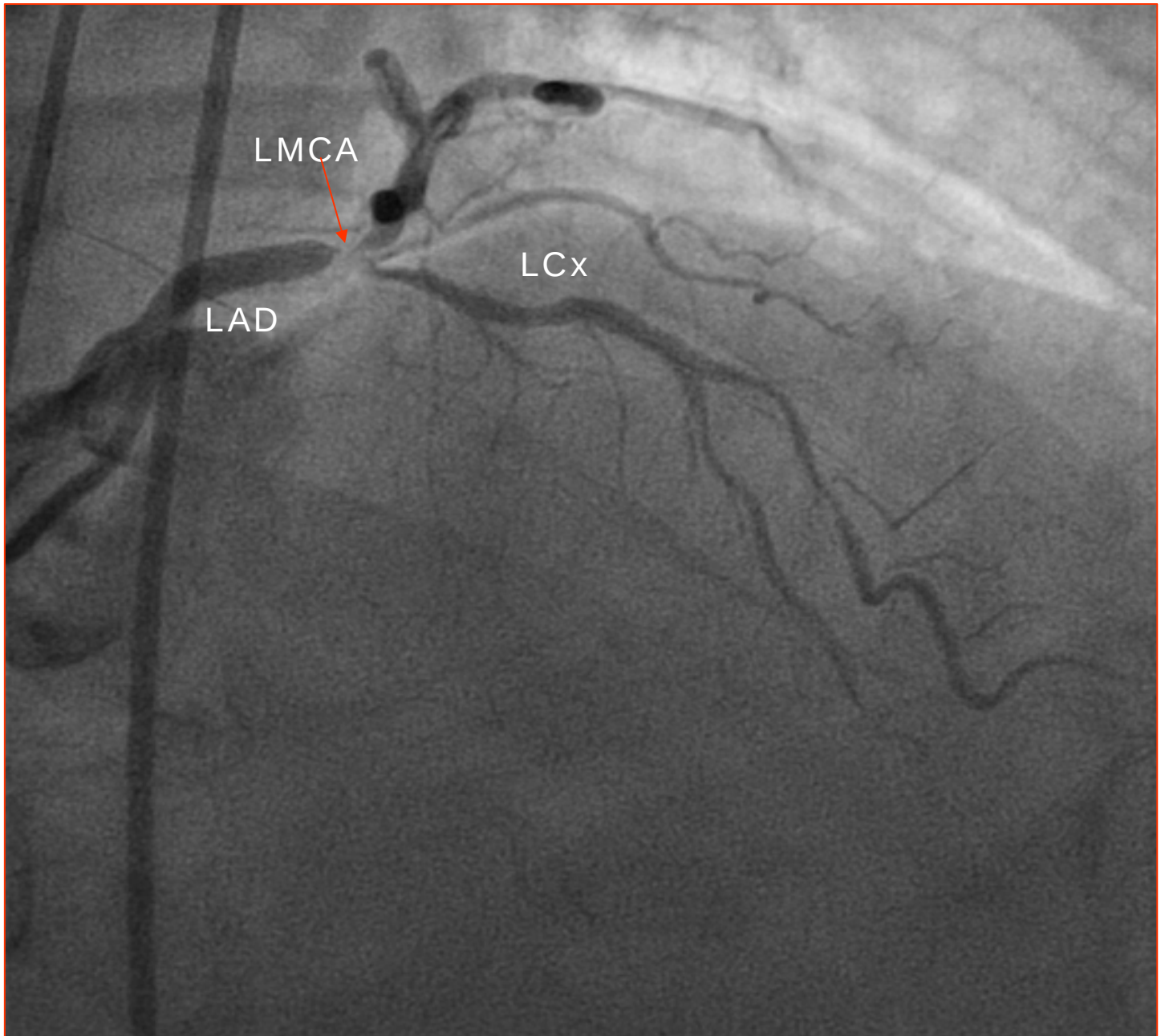


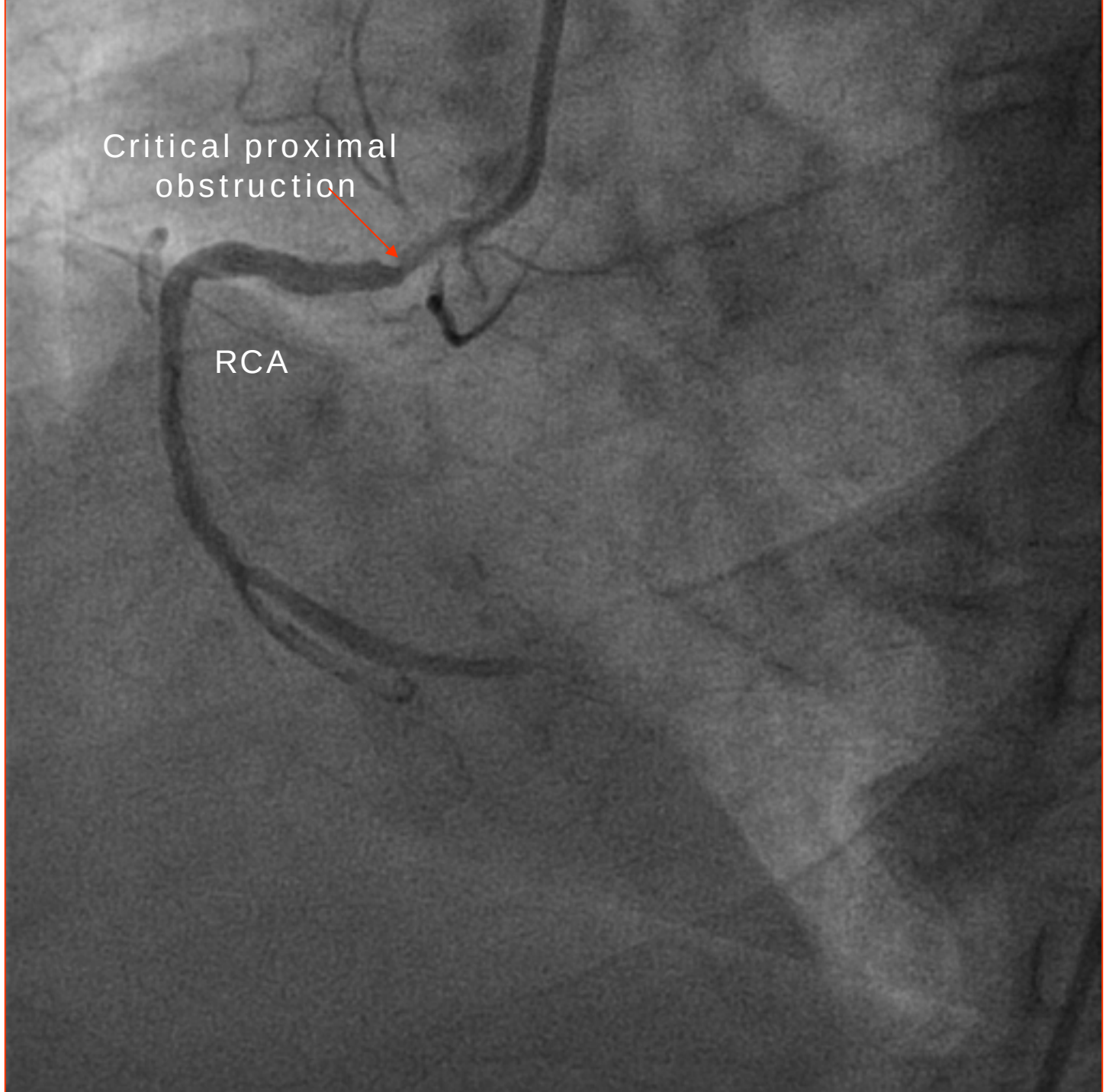


First Second


LMCA critical occlusion

Left Anterior Oblique (LAO) caudal projection: show the proximal of LMCA and the proximal segments of LAD and LCx




Critical proximal
obstruction
RCA

The hemodynamic study showed a critical lesion of the left main coronary artery and critical lesion of the proximal right coronary artery.
He was immediately referred for coronary artery bypass grafting surgery with good outcomes.
Emergency surgical revascularization was undertaken. coronary artery bypass.