Chagasic cardiomyopathy: general concepts - 2017

Dr. Andrés R. Pérez Riera

Chronic chagasic cardiomyopathy

Concept: chronic, fibrosing, necrotic, vasculopathic, immunopathic, disautonomic, accumulative, progressive and diffuse myocarditis, characterized by:

- Fibrosis: reparative and reactive interstitial.
- Necrosis: by necrotizing microvascular artheritis that leads to platelet thrombosis and subsequent hypoperfusion and foci of myocytolytic necrosis, which progressively destroy both myocytic contractile cells (myocytolysis) and the excito-conductor system.
- Immunopathic: crossed autoimmune reaction, triggered against the antigen MXT of tripanosoma Cruzi, homologous to myosin of cardiac structures.
- Autonomic denervation: of focal character, irregular distribution, variable and unpredictable.

Endemic concepts about chronic chagasic cardiomyopathy

- Endemic in Latin America from the north of Mexico to the South of Argentina and Chile. 17,000,000 infected and 90,000,000 exposed. 120,000 new cases diagnosed in Latin America.
- 17 thousand deaths/year in Brazil, from which 5 thousand are by heart disease.
- 5 to 6 millions of Chagasic patients in Brazil, from whom 1 million present heart failure.
- 60% of patients display the indeterminate form and only 10% severe heart disease.
- In Sao Paulo Capital City, it is estimated in 300,000 infected patients. In the state of Sao Paulo there are 500.

Classification of cardiac forms of chagas disease

- Indeterminate
- Arrhythmogenic:
    a) Predominantly dromotropic.
    b) Predominantly extrasystolic.
- Forms with ventricular dysfunction: chronic dilated chagasic cardiomyopathy.
- Thromboembolic forms.
- Mixed forms.

ECG in chronic chagasic cardiomyopathy

Characteristic transitoriness of ECG manifestations.

ECG is the method of choice in longitudinal population studies in endemic areas because it is simple, with a low cost and a good sensitivity. The ECG has prognostic value.

Rhythm: sinus node dysfunction: persistent sinus bradycardia, SA block in different degrees, sinus arrest and inappropriate chronotropic response in stress test. The corrected recovery time of the SA node and SA conduction time are altered (18% to 30%).

Dromotropic alterations in the AV excito-conductor system: type II first or second degree blocks (14.3%) trifascicular block and even total AV block (2.5%).

Post-His: the most frequent ones are first degree AV blocks, with broad QRS, which in 50% of cases are located in the AV node and the rest in the His-Purkinje system or in both.

CRBBB + LAFB, negative T wave and polymorphic premature ventricular contractions are typical (25%).

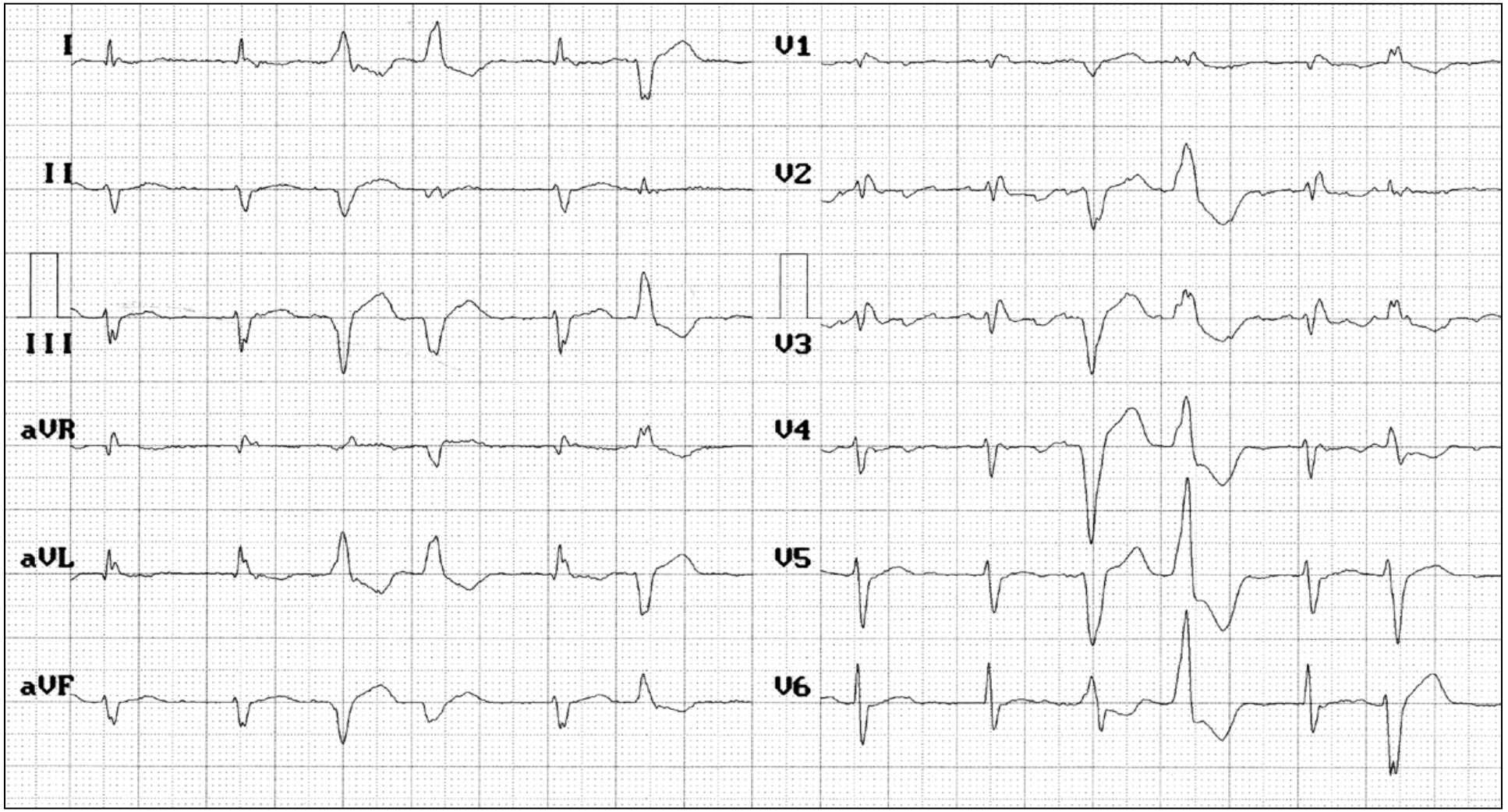
Electrically inactive areas by “apical lesion”.

S-VT or NS-VT: the most frequent location of VT is inferoposterior and lateral regions, followed by septal and apical regions, and their main mechanism is reentry, involving fibrotic and/or aneurysmatic areas.

Electrocardiographic elements of poor prognosis in chronic chagasic myocarditis

- Presence of atrial fibrillation or flutter;
- Presence of CLBBB (rare) in 91.3% of the cases and decreased ejection fraction;
- Presence of total AV block;
- Presence of anterior and inferior electrically inactive area;
- Presence of polymorphic premature ventricular contractions or in salvoes;
- Presence of NS-VT associated to decreased EF: 80% of mortality in 13 years of follow-up. When the EF is normal, the prognosis is good;
- Presence of S-VT: 100% of mortality in five years.

Typical ECG of chronic chagasic heart disease



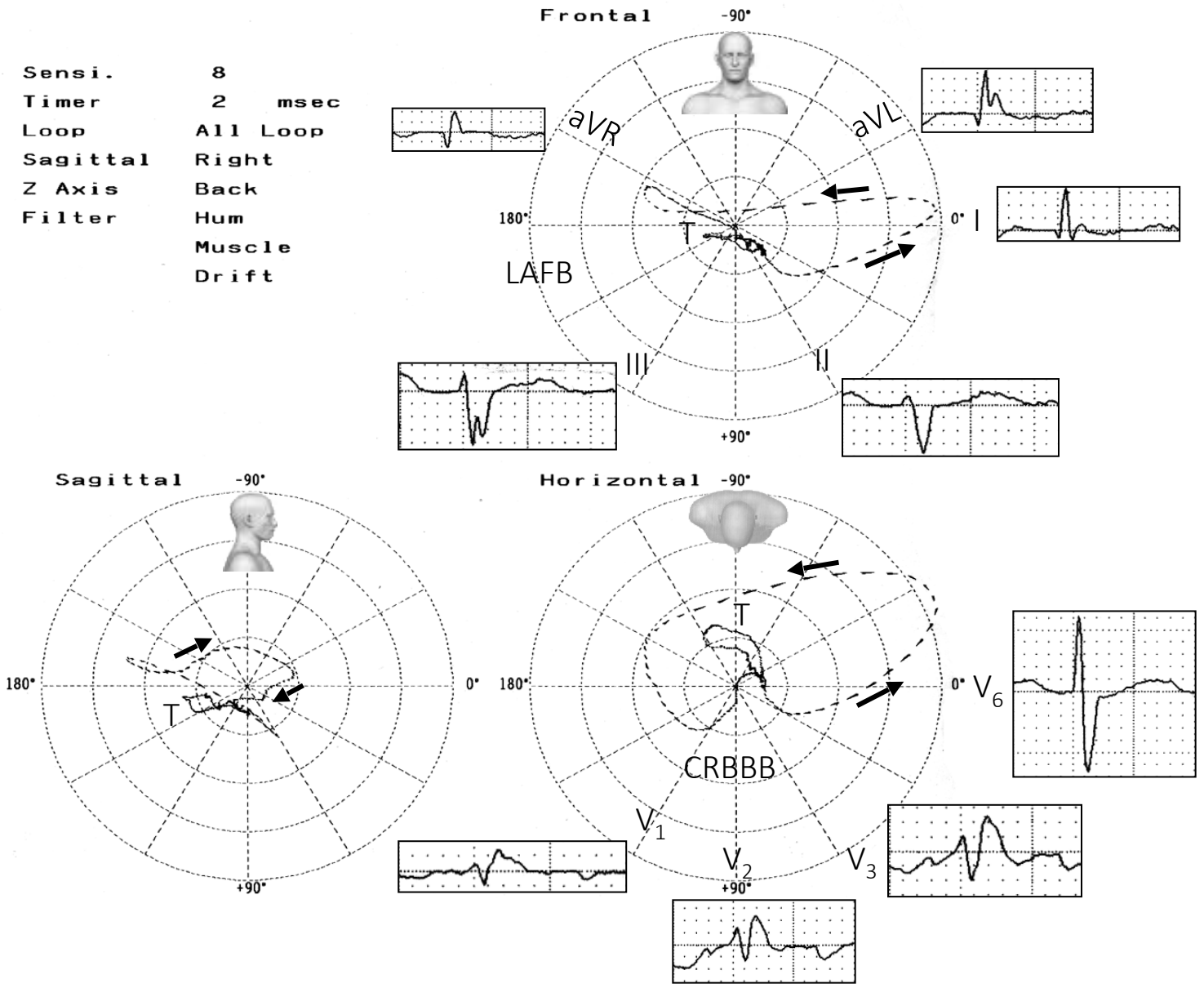
P wave difficult to visualize, which indicates intense fibrosis of atrial tissue.

LAFB: extreme shift of ÂQRS in the left superior quadrant, around –75º, qR in I and aVL, rS in inferior leads with S wave in V_5 and V_6

CRBBB: triphasic complex, rsr' type, from V_1 to V_3, broad r wave in aVR and S wave in V_5 and V_6. Coupled polymorphic premature ventricular contractions.

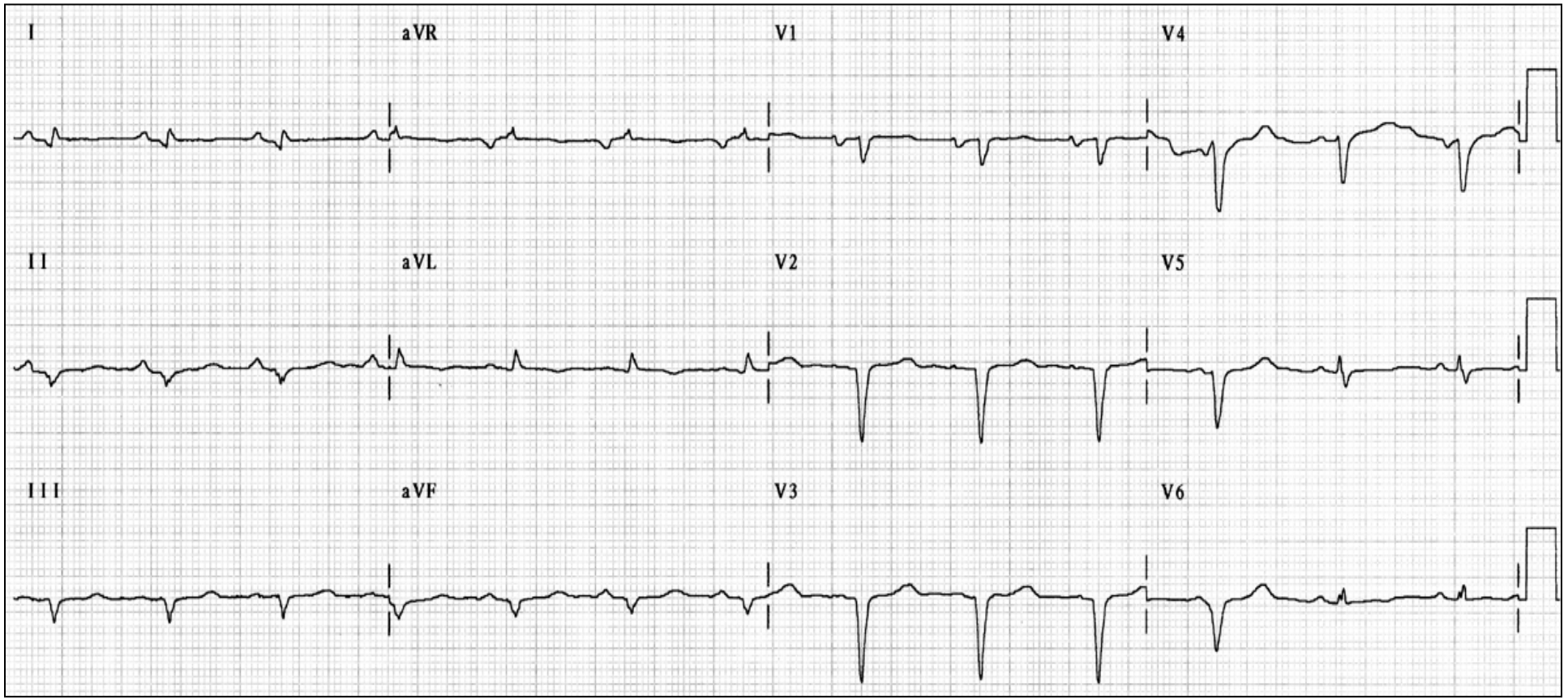
Classical triad: CRBBB + LAFB + polymorphic premature ventricular contractions.

ECG/VCG correlation of typical chronic chagasic cardiomyopathy: CRBBB + LAFB + polymorphic premature ventricular contractions



ECG/VCG of a typical case of chagasic cardiomyopathy

Name: LRS; Sex: F; Age: 24 y/o; Ethnic group: Afro-descendant; Weight: 54 Kg; Height: 1.68 m; Biotype: Normal Date: 09/09/2003; Medication in use: digoxin 0.25 mg 1x; enalapril 10 mg 2x; spironolactone 25 mg 1x; amiodarone 200 mg 1x; carvedilol; ASA 100 mg 2x.

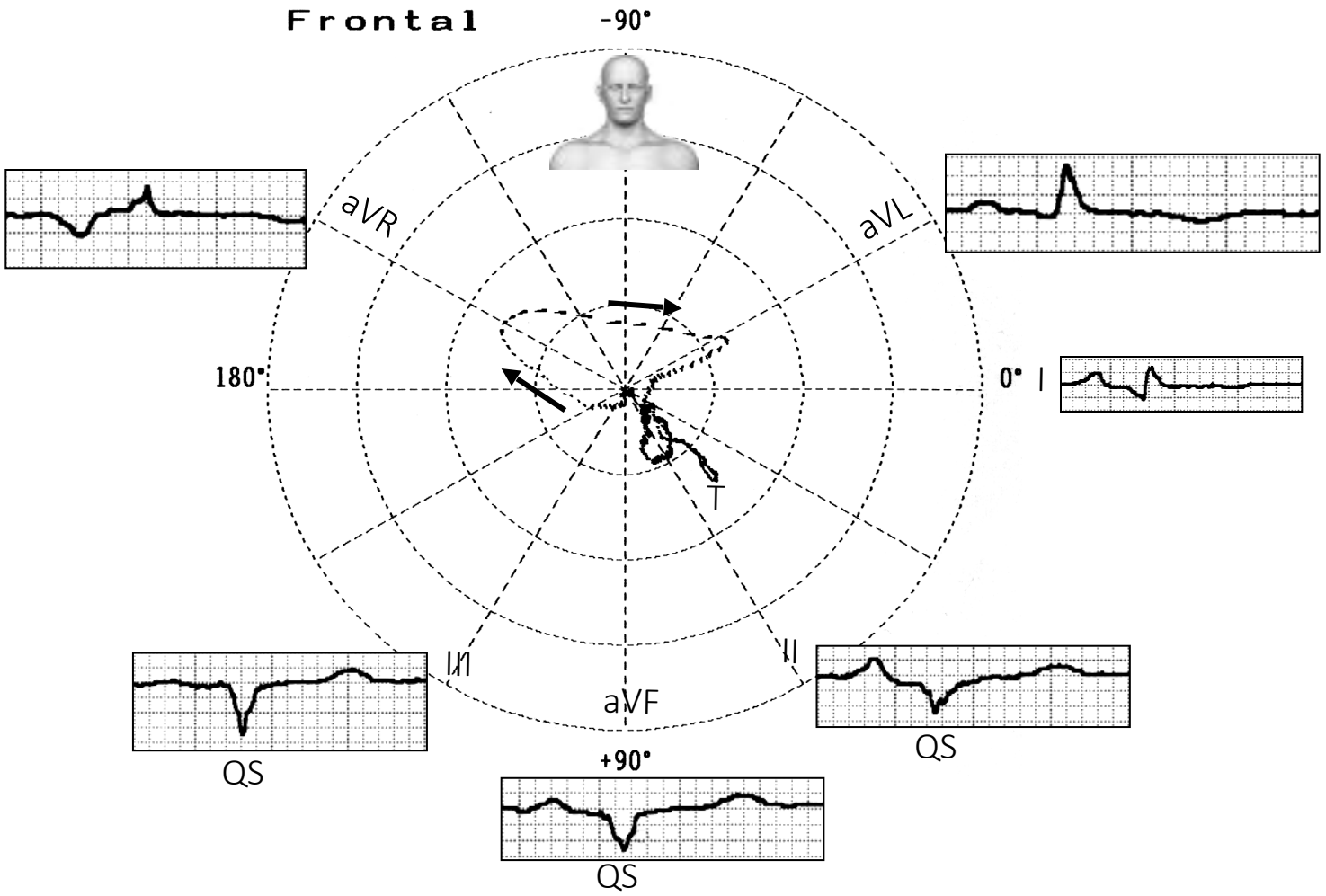


Clinical diagnosis: Chronic Chagasic Cardiomyopathy, Mixed Form with Arrhythmia and CHF.

ECG diagnosis: SR; HR: 76 bpm; P wave: SAP +40º forward; slow final negative component in V1: LAE; PR interval: 183 ms; QRS: SÂQRS: -70º: extreme backward shift in the left superior quadrant and 92 ms duration. QS: II, II and aVF: inferior electrically inactive area. QS from V1 to V3: anterior electrically inactive area. QTc interval: 470 ms (prolonged for heart rate).

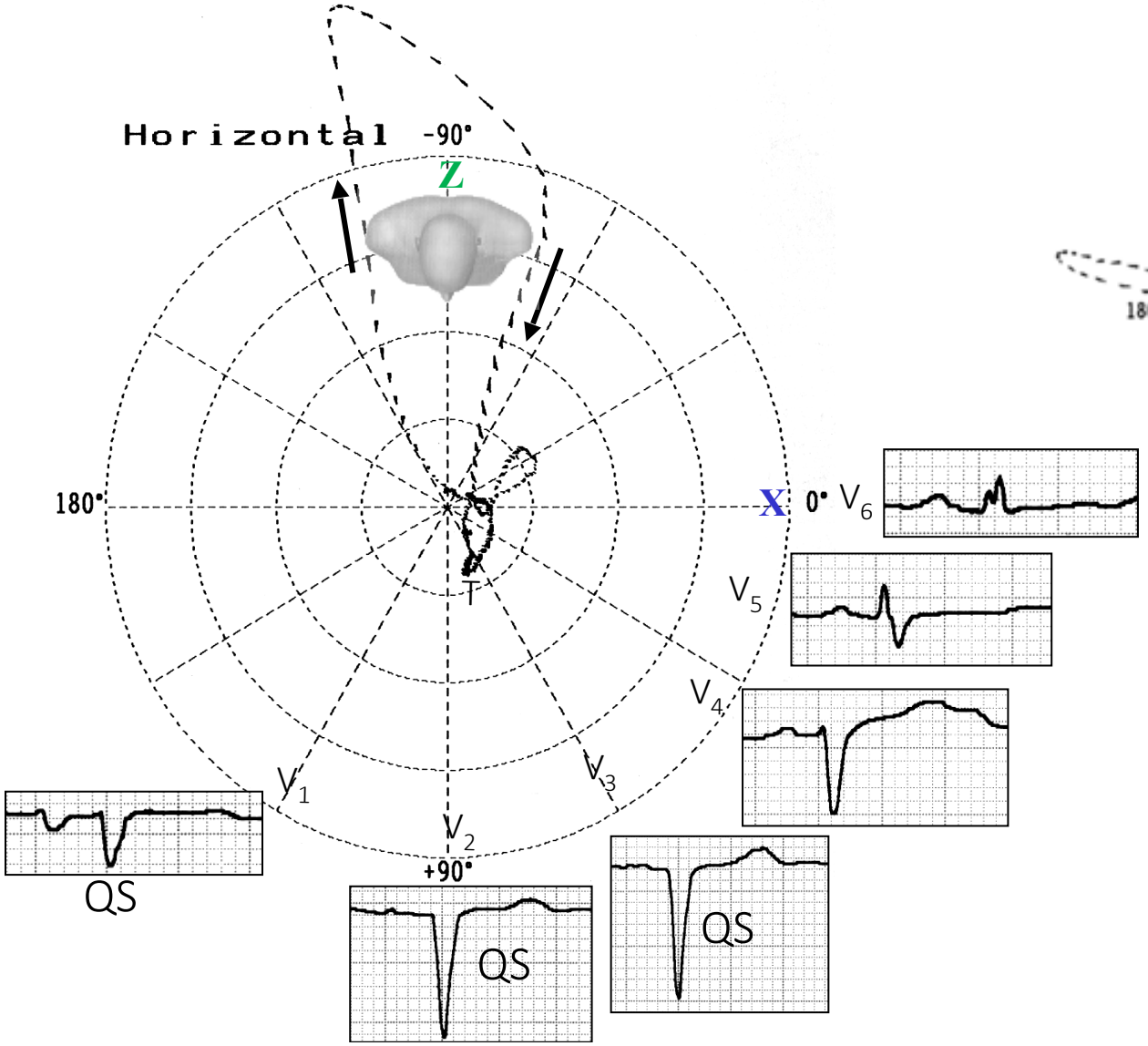
Conclusion: LAE + anterior, inferior, and anteroapical electrically inactive area. Prolonged QT interval.

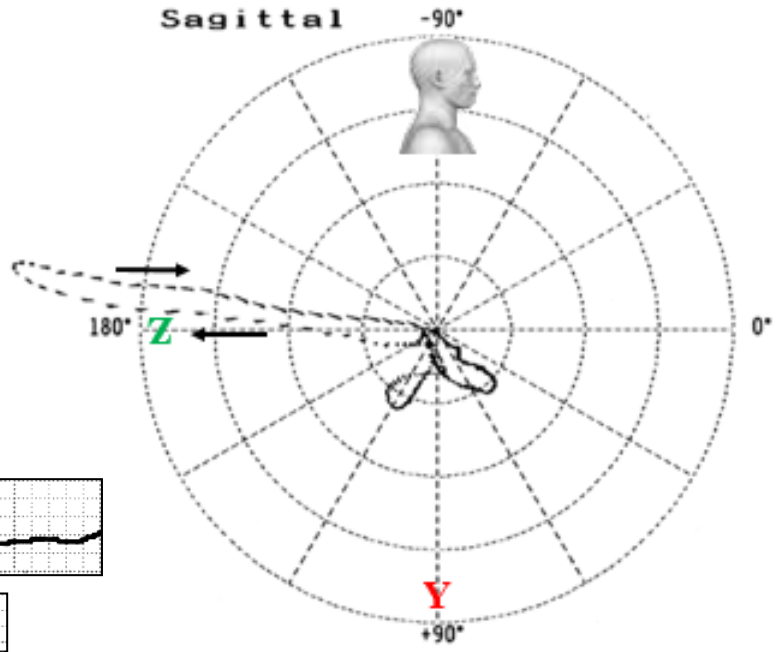
ECG/VCG correlation in the frontal plane



Inferior electrically inactive area. QRS loop of clockwise rotation, superior shift and with initial and final delay. Low voltage r wave indicating high lateral extension. Probable high lateral extension.

ECG/VCG correlation in the horizontal and right sagittal planes

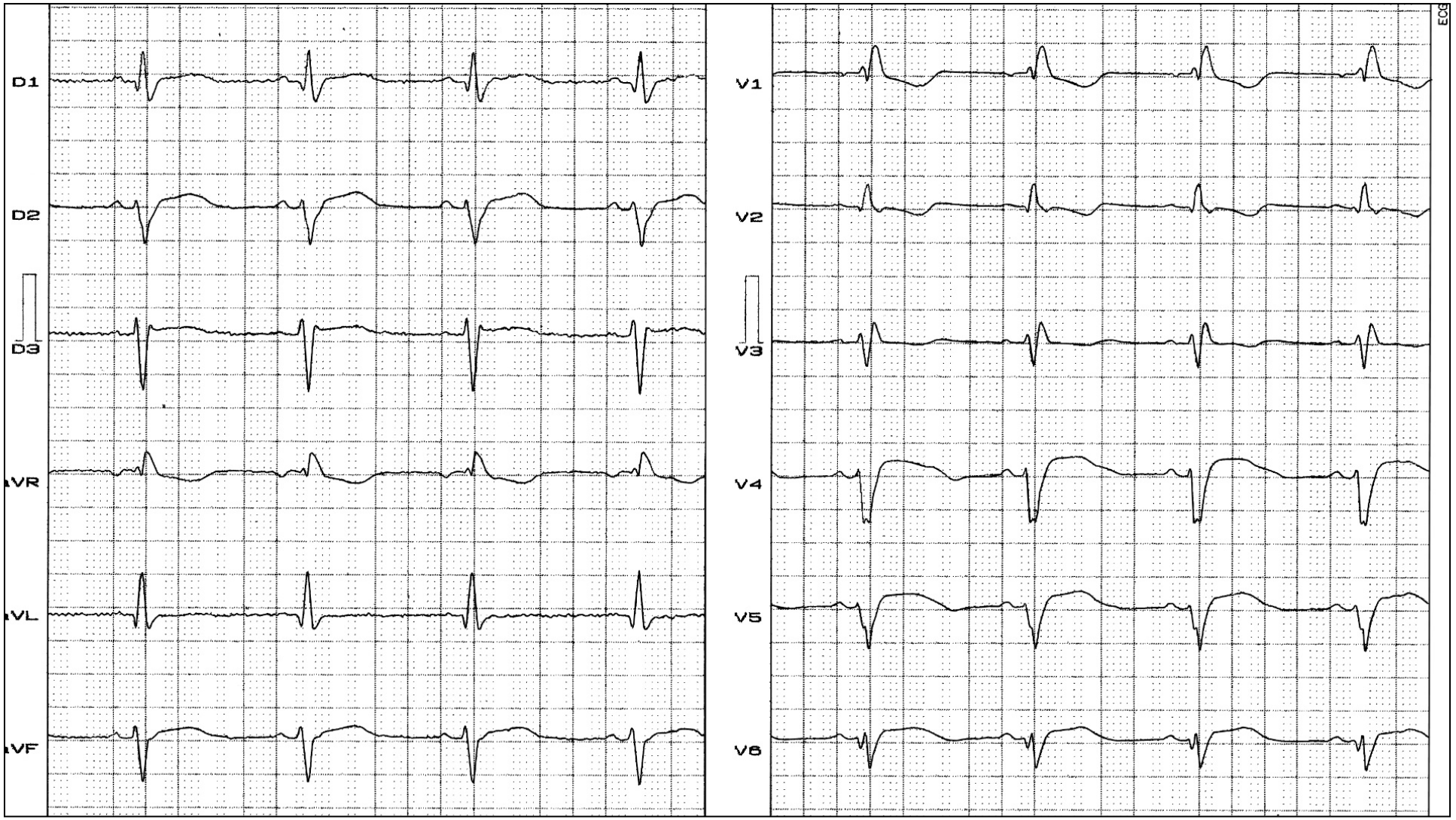




Sensi.	8
Timer	2 msec
Loop	All Loop
Sagittal	Right
Z Axis	Back
Filter	Hum
	Muscle
	Drift

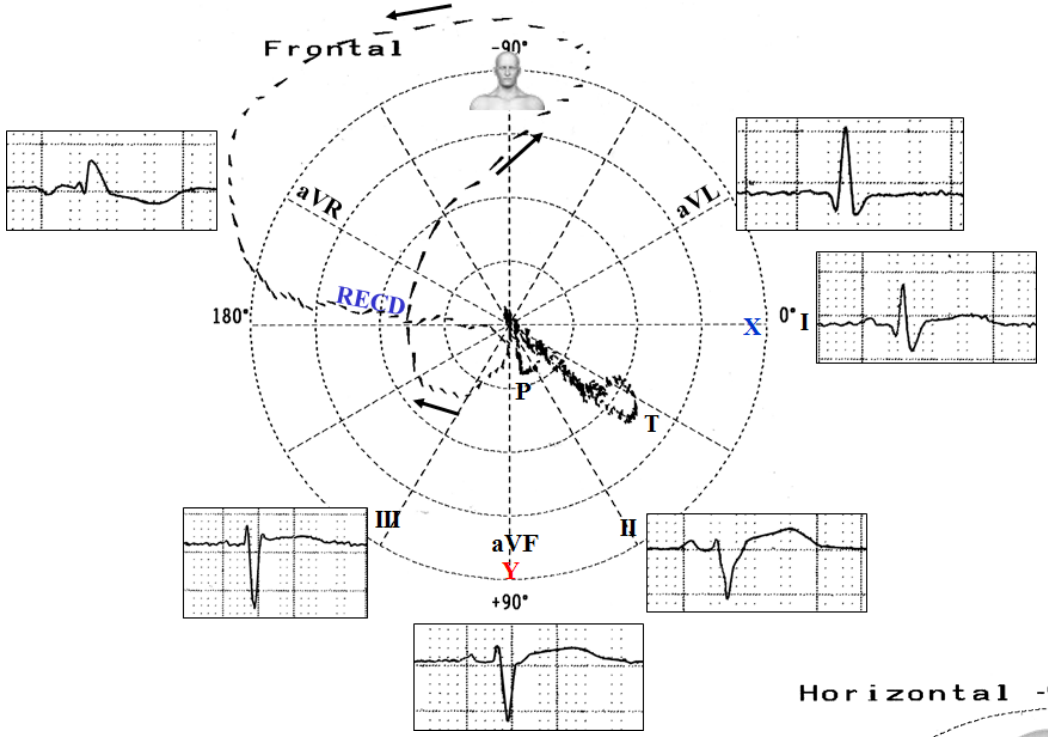
QRS loop of clockwise rotation, posterior shift and with initial and final delay. R of V4-V6 indicates probable LV free wall severe fibrosis. Anterior electrically inactive area, probable apical extension.

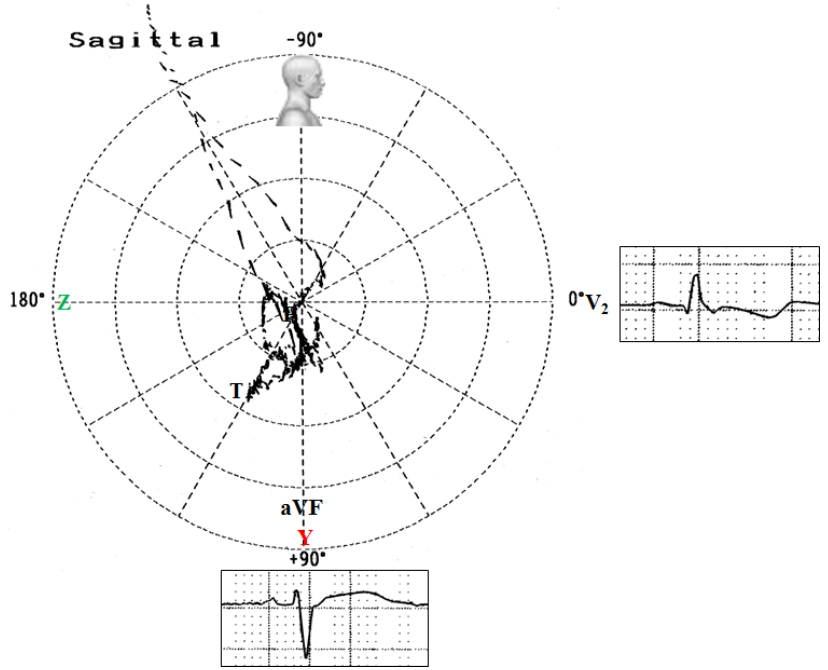
Name: CRDS; Sex: M; Age: 56 y/o; Ethnic group: Caucasian; Weight: 67 Kg; Height: 1.68 m;
Date: 15/05/2008; Medications in use: Amiodarone 300 mg daily



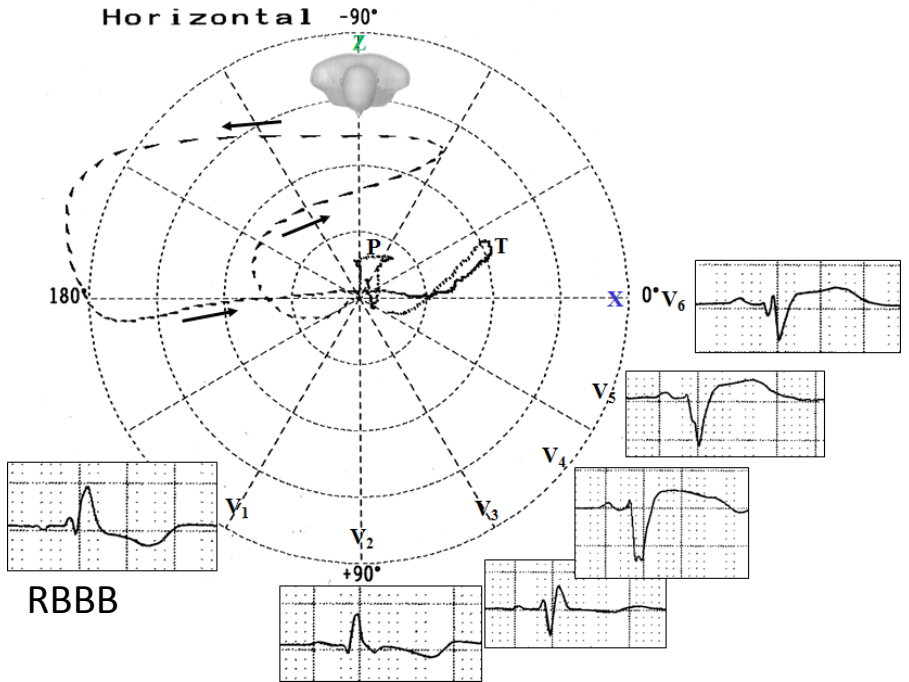
Clinical Diagnosis: Chronic chagasic myocarditis.
ECG diagnosis: Extreme left axis deviation (QRS axis -90º: LAFB + complete RBBB + anterolateral low voltage suggestive of anterior fibrosis).

ECG/VCG correlation of the same patient





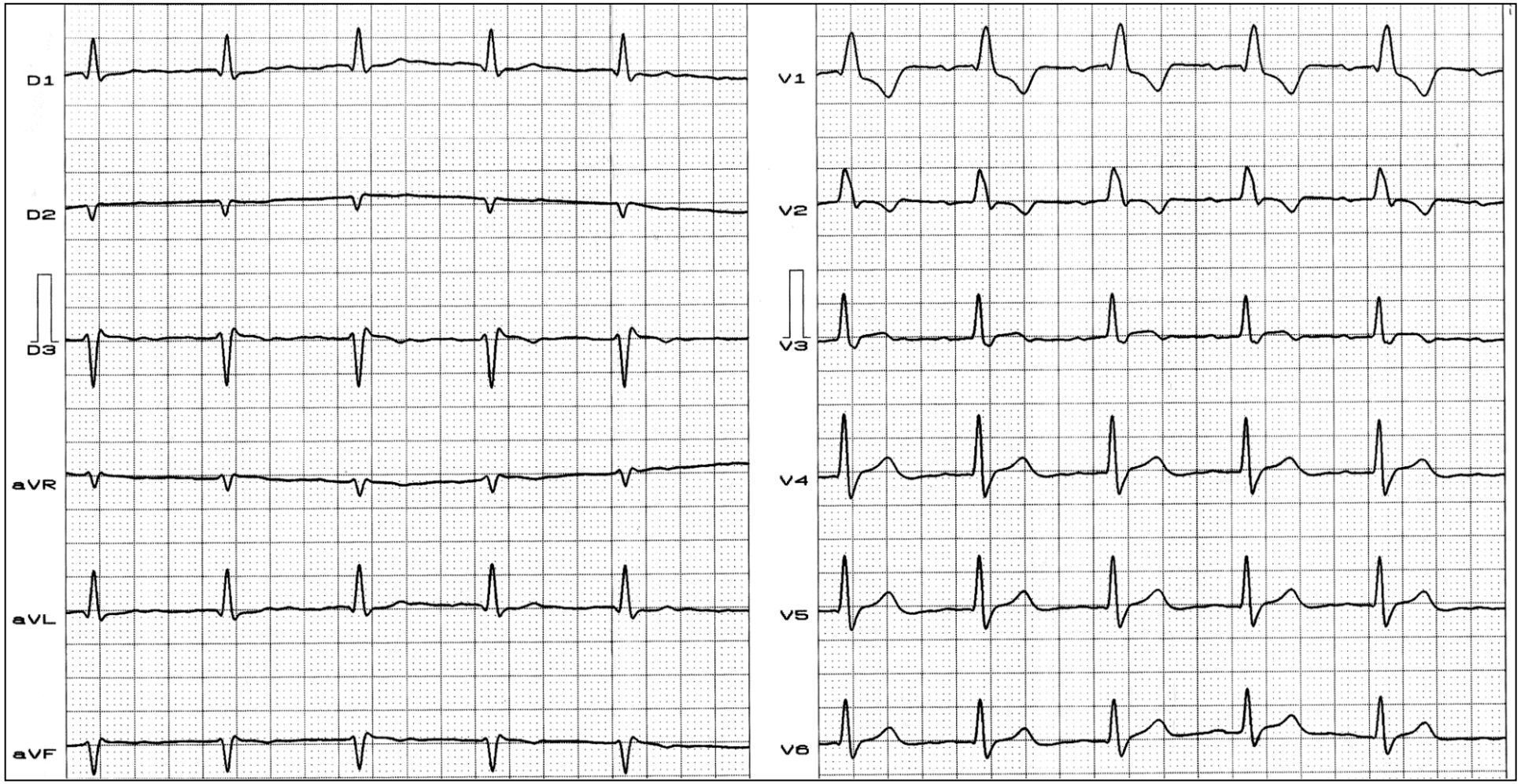
Sensi.	8
Timer	2 msec
Loop	All Loop
Sagittal	Right
Z Axis	Back
Filter	Hum
	Muscle
	Drift



RBBB

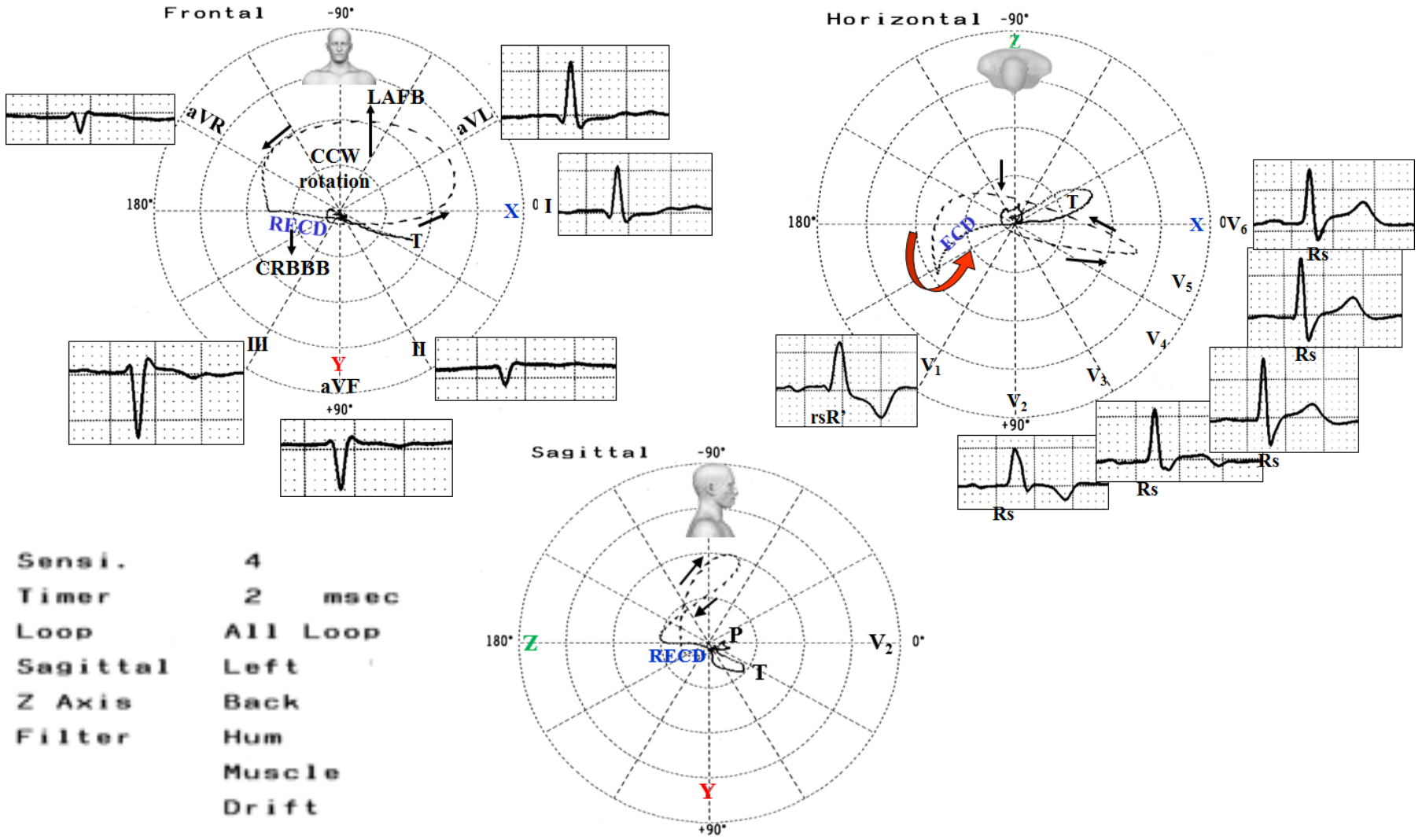
Low apical voltage

Name: OO; Sex: M; Age: 51 y/o; Ethnic group: Asian; Weight: 71 Kg; Height: 1.679 m;
Date: 04/19/2004; Medication in use: nothing stated.



Clinical diagnosis: chronic chagasic heart disease, dromotropic form + gout.
Echocardiographic diagnosis: telesystolic prolapse with mild escape. EF: 73%
ECG diagnosis: HR: 77 bpm, P wave difficult to visualize in the frontal plane; PR: 200 ms; SÂQRS –70º; QRSd: 150 ms; Rs from V2 to V6.
Conclusion: CRBBB + LAFB + PAF (prominent anterior forces). The difficult visualization of P wave in the FP may indicate a certain degree of atrial wall fibrosis (sino-ventricular conduction).

ECG/VCG correlation



FP: Extreme shift of SÂQRS in left superior quadrant, QRS loop CCW rotation, qR in I and aVL, SIII > SIII = LAFB. RECD located in the right portion of orthogonal X lead: complete RBBB.

HP: Initial forces preserved, afferent limb behind the X line, RECD located in the right anterior quadrant with glove-finger morphology, T loops directed to the back and leftward: CRBBB Grishman or Kennedy type A. Triphasic pattern in V1, broad final S wave in left leads: CRBBB.