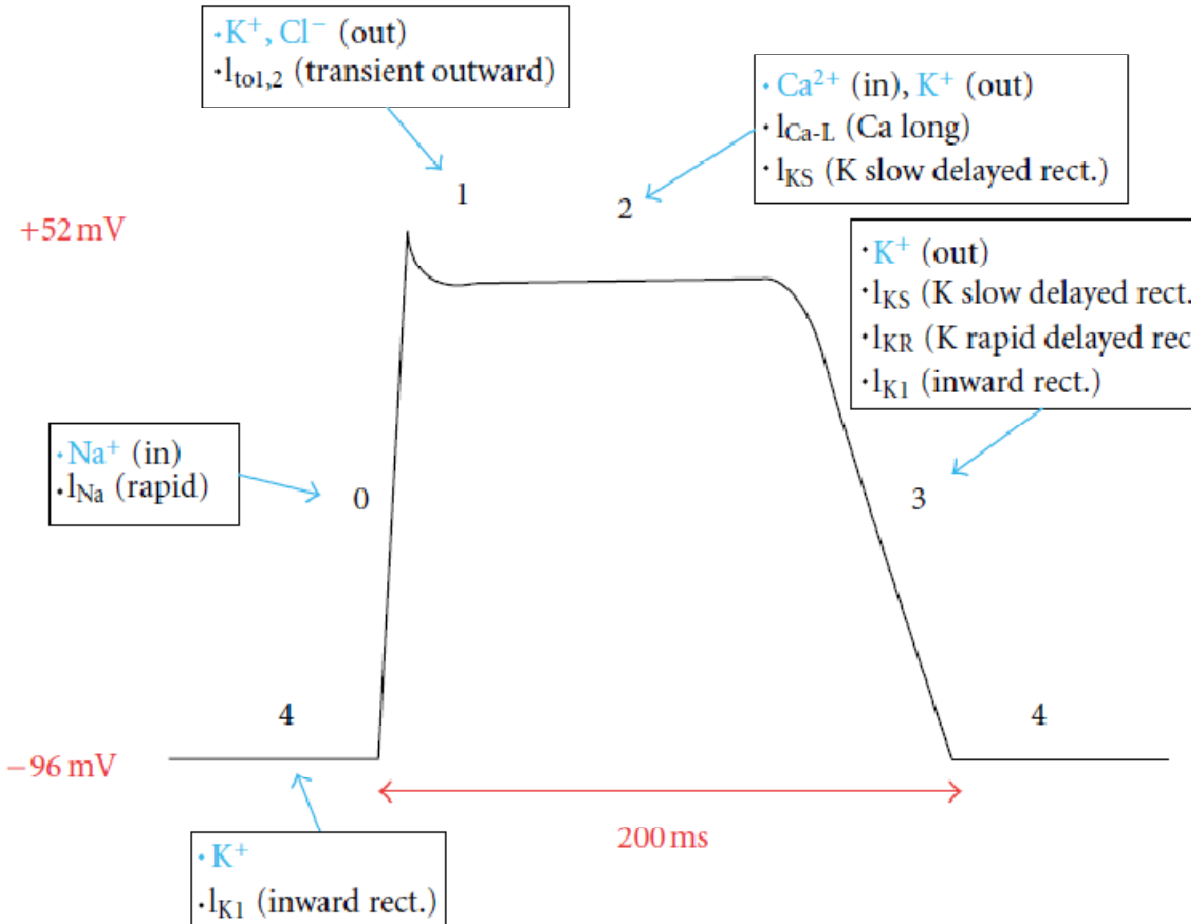
29° Congresso Baiano de Cardiologia do Estado da Bahia

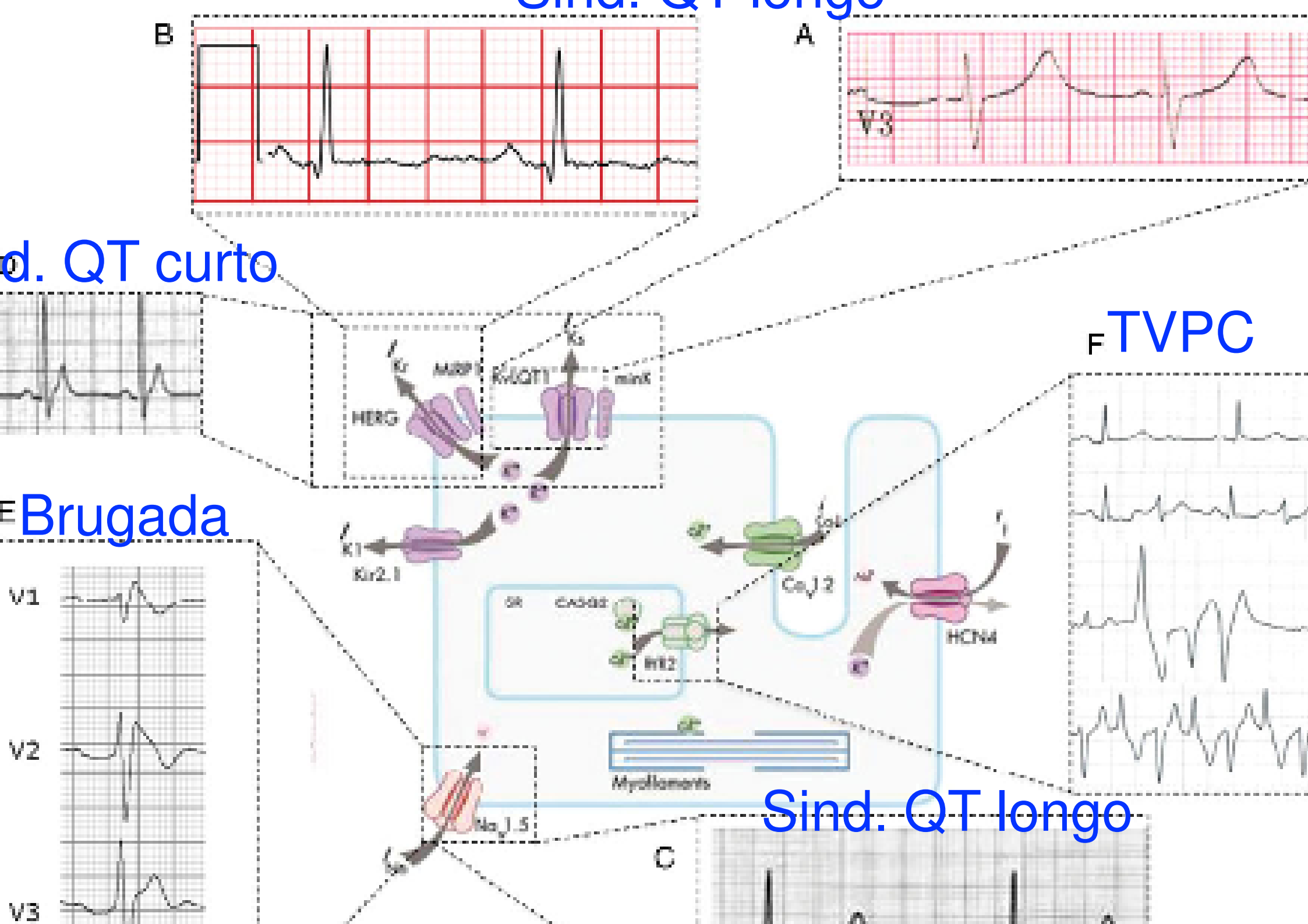
CANALOPATIAS NA OPULAÇÃO PEDIÁTRIC

Dra. Júlia Maria da Silva Lopes

Canalopatias na População Pediátrica

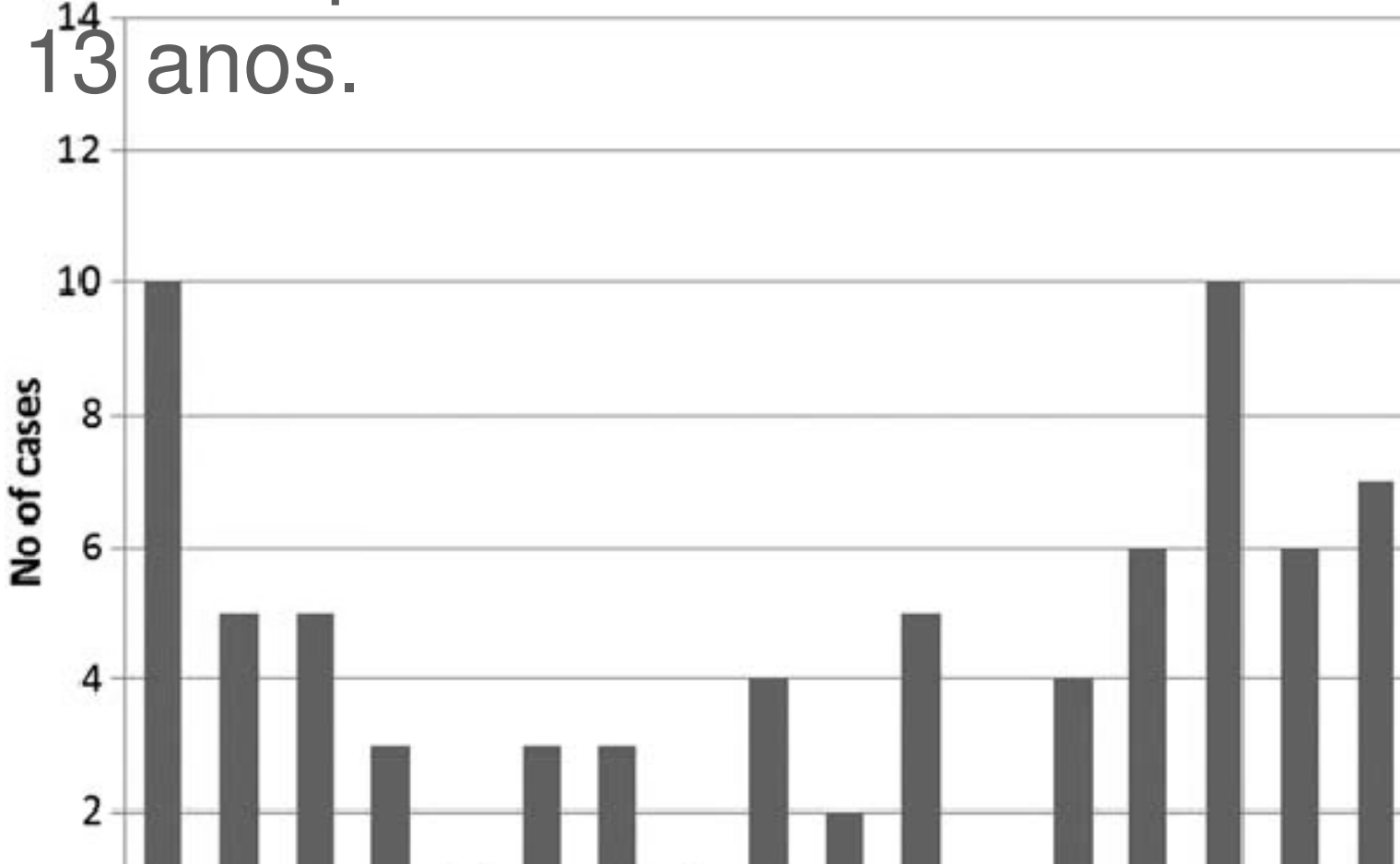
oenças do canais
cos




Sind. QT longo
B
A
V3
d. QT curto
TVPC
F
Brugada
E
V1
V2
V3
HERG
KvLQT1
minK
MiRP1
Kir2.1
CaV1.2
HCN4
SR
CASQ2
RYR2
Myofilaments
NaV1.5
C
Sind. QT longo

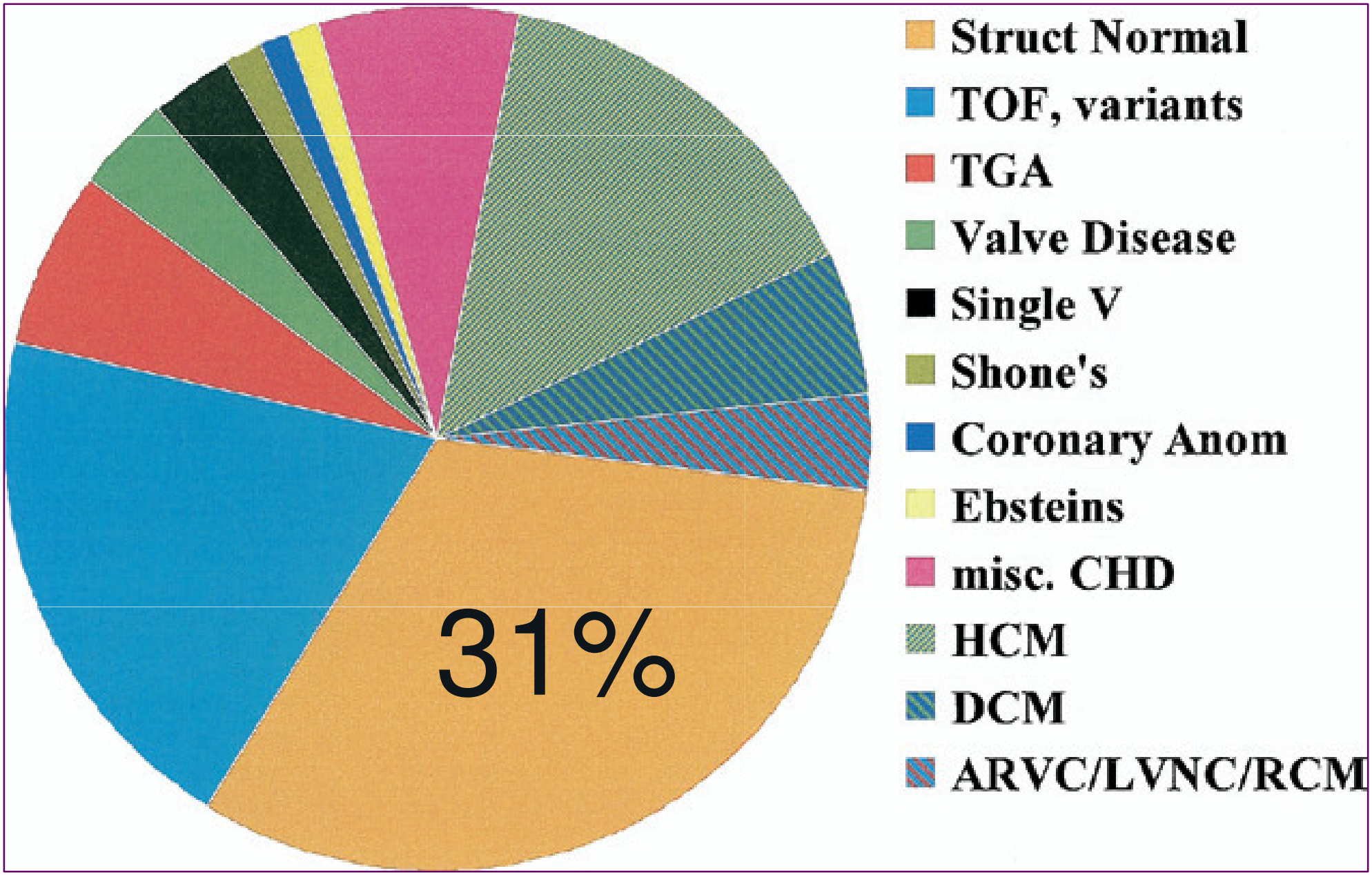
Cardiopatias na População Pediátrica

A morte súbita cardíaca representa 19% das MS em crianças entre 1 e 13 anos.

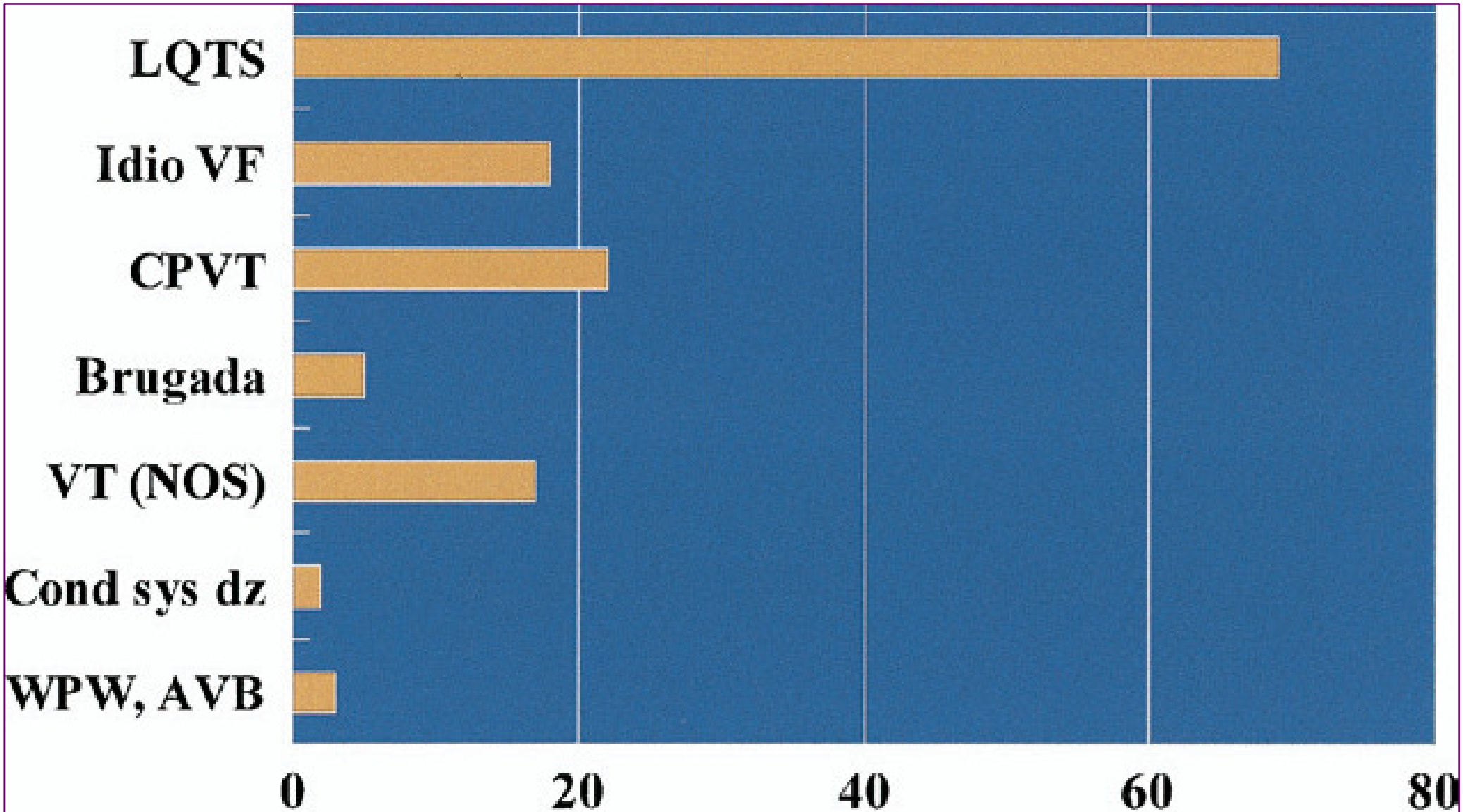


ion 2007;115:2042-2048

s T. Beroul, MD,* George F. Van Hare, MD,†‡ Naomi J. Kertesz, MD,§ Anne M. Dubin, MD,† Frank Cecchin, MD,
n K. Collins, MD,‡ Bryan C. Cannon, MD,§ Mark E. Alexander, MD,*John K. Triedman, MD,* Edward P. Walsh,
Richard A. Friedman, MD§
on, Massachusetts; Palo Alto and San Francisco, California; and Houston, Texas



s I. Berul, MD,* George F. Van Hare, MD,†‡ Naomi J. Kertesz, MD,§ Anne M. Dubin, MD,† Frank Cecchin, MD,
n K. Collins, MD,‡ Bryan C. Cannon, MD,§ Mark E. Alexander, MD,*John K. Triedman, MD,* Edward P. Walsh,
Richard A. Friedman, MD§
on, Massachusetts; Palo Alto and San Francisco, California; and Houston, Texas



Síndrome do Qt longo

Autossômica dominante com penetrância variável

Adolescência

Torsades de pointes

Paciente jovem 1/2500

: Curr Opin Cardiol, Vol23(3).2008.184–191

$$= \frac{\text{Q-Tmedido}}{\sqrt{\text{R-R}}}$$

o:

,40 / √ 0,84

= 0,430 seg

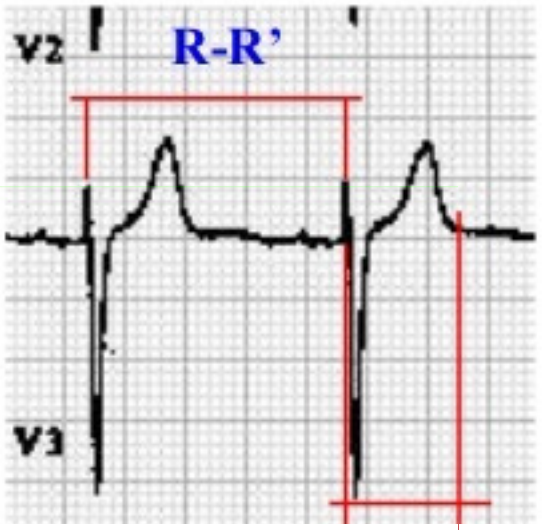


Table 1 Suggested Bazett-Corrected QTc Values for Diagnosing QT Prolongation

Rating	1–15 yrs	Adult Male	Adult Femal
ormal	<440	<430	<450
orderline	440–460	430–450	450–470
rolonged	>460	>450	>470

A. QTc[b]	
>480 ms	3
—460–470 ms	2
450–459 (male) ms	1
B. Torsade de pointes[c]	2
C. T wave alternans	1
D. Notched T wave in three leads	1
E. Low heart rate for age[d]	0.5
Clinical history	
A. Syncope[c]	
With stress	2
Without stress	1
B. Congenital deafness	0.5
Family history[e]	
A. Family members with definite LQTS	1
B. Unexplained sudden cardiac death below age 30 among immediate family members	0.5

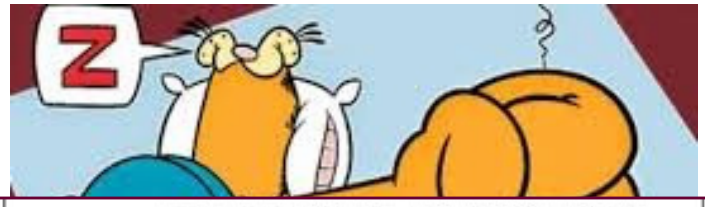
Score: ≤ 1 point, low probability of LQTS; > 1 to 3 points, intermediate probability of LQTS; > 3.5 points, high probability of LQTS

Long QT Syndrome (LQTS)* including Sudden Infant Death Syndrome (SIDS) [£]						
Gene	Locus	Syndrome	Protein & subunit	Function & abnormality	Occurs In [¶]	Ref.
CNQ1	11p15.5	LQTS1, SIDS [£]	$K_V7.1$ α	I_{Ks} ↓ KvLQT1	30-35%	74,77,165
CNH2	7q35	LQTS2, SIDS [£]	$K_V11.1$ α	I_{Kr} ↓ HERG	25-30%	75
CN5A	3p21	LQTS3, SIDS [£]	$Na_V1.5$ α	I_{Na} ↑	5-10%	1,12,28,15
ANK2	4q25	LQTS4, ABS [$]	Ankyrin-B	$I_{Na,K}$ ↓ I_{NCX} ↓	1-2%	43-45
CNE1	21q22.1	LQTS5	minK β	I_{Ks} ↓	1%	76,78
CNE2	21q22.1	LQTS6, SIDS [£]	MiRP1 β	I_{Kr} ↓	rare	79
CNJ2	17q23	LQTS7, ATS [#]	Kir2.1 α	I_{K1} ↓	rare	80,81
CNA1C	12p13.3	LQTS8, TS [&]	$Ca_V1.2$ α_{1c}	$I_{Ca,L}$ ↑	rare	82,83
CAV3	3p25	LQTS9, SIDS [£]	Caveolin-3	I_{Na} ↑	rare	84,85
CN4B	11q23	LQTS10	$Na_V1.5$ β4	I_{Na} ↑	rare	86
KAP9	7q21	LQTS11 [Ω]	Yotiao [Ω]	I_{Ks} ↓ KvLQT1	rare	159a
CNQ1	11p15.5	JLNS1 [+]	$K_V7.1$ α	I_{Ks} ↓ KvLQT1	rare	87,88
CNE1	21q22.1	JLNS2 [++]	minK β	I_{Ks} ↓	rare	78

Síndrome do Qt longo

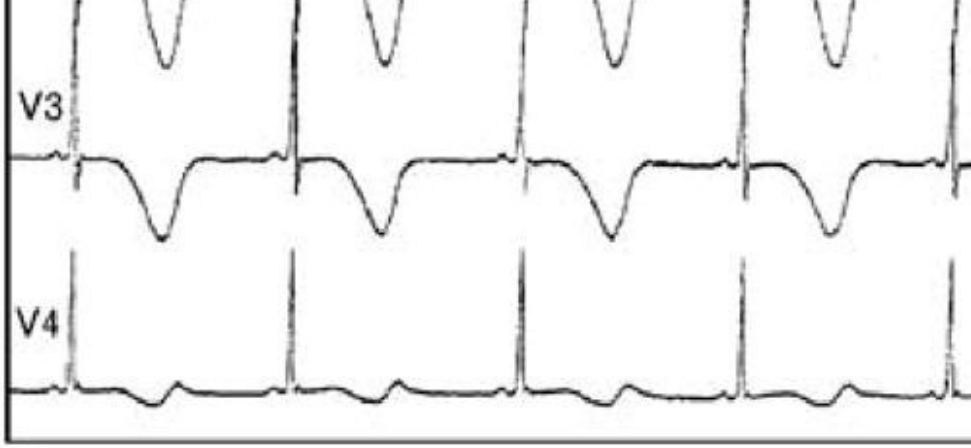
mmon Forms of the Long-QT Syndrome.*

	Genetic Subtype		
	LQT1	LQT2	LQT3
ociated gene	*KCNQ1*	*KCNH2*	*SCN5A*
ct	Decreased I_{Ks}	Decreased I_{Kr}	Increased plateau
rrhythmia†	Emotional or physical stress, swimming, diving	Emotional or physical stress, sudden loud noise	Rest, sleep
ng ECG‡	Broad T wave	Low-amplitude T wave with notching	Long isoelectric S
t of arrhythmia§	No pause	Pause	Not established
with exercise	Failure to shorten	Normal	Supranormal
ng with mexiletine¶	No	No	Yes
onse to beta-blockers	Yes	Less than LQT1 response	Uncertain



la T diferentes em
mbros da mesma familia

QTc: 630 ms

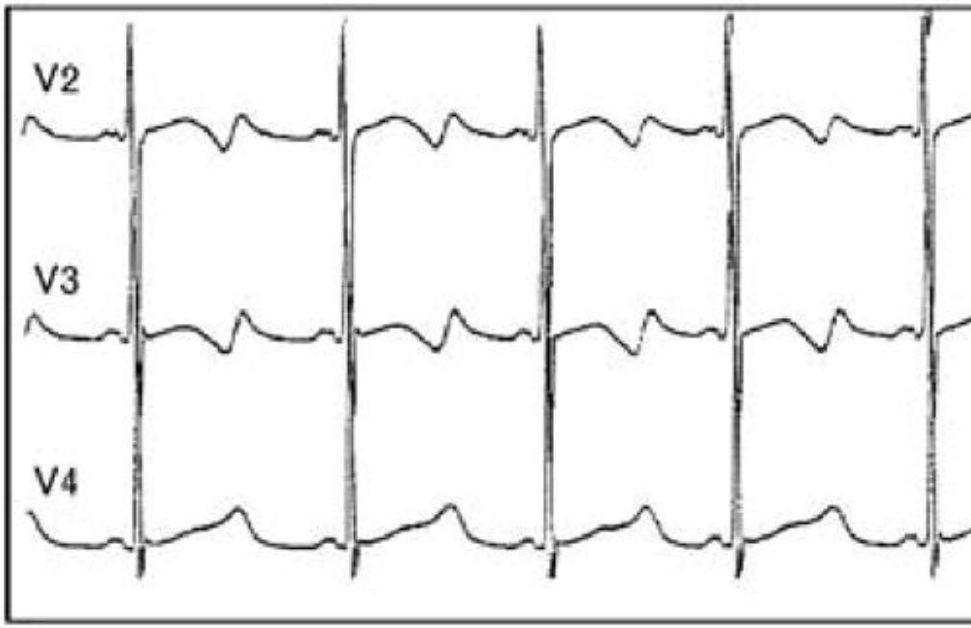


(b)

Sister

S.T. 10 years

QTc: 605 ms

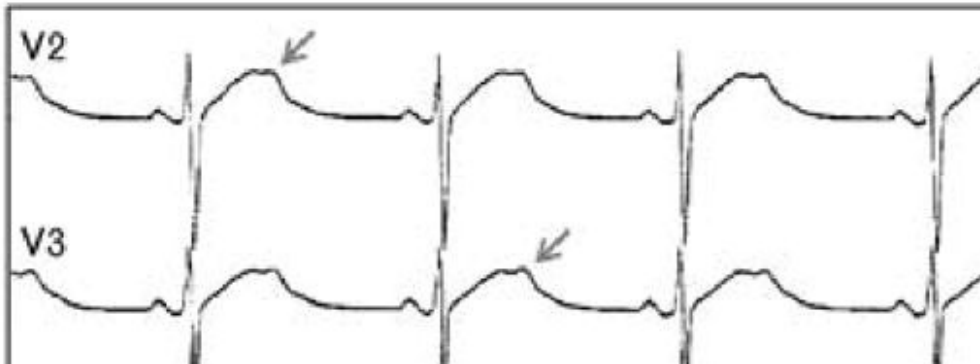


(c)

Father

V.T. 37 years

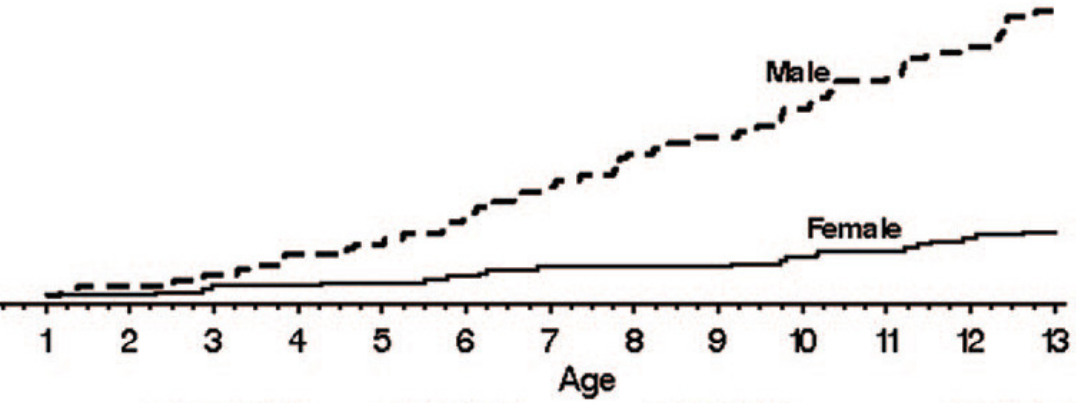
QTc: 584 ms



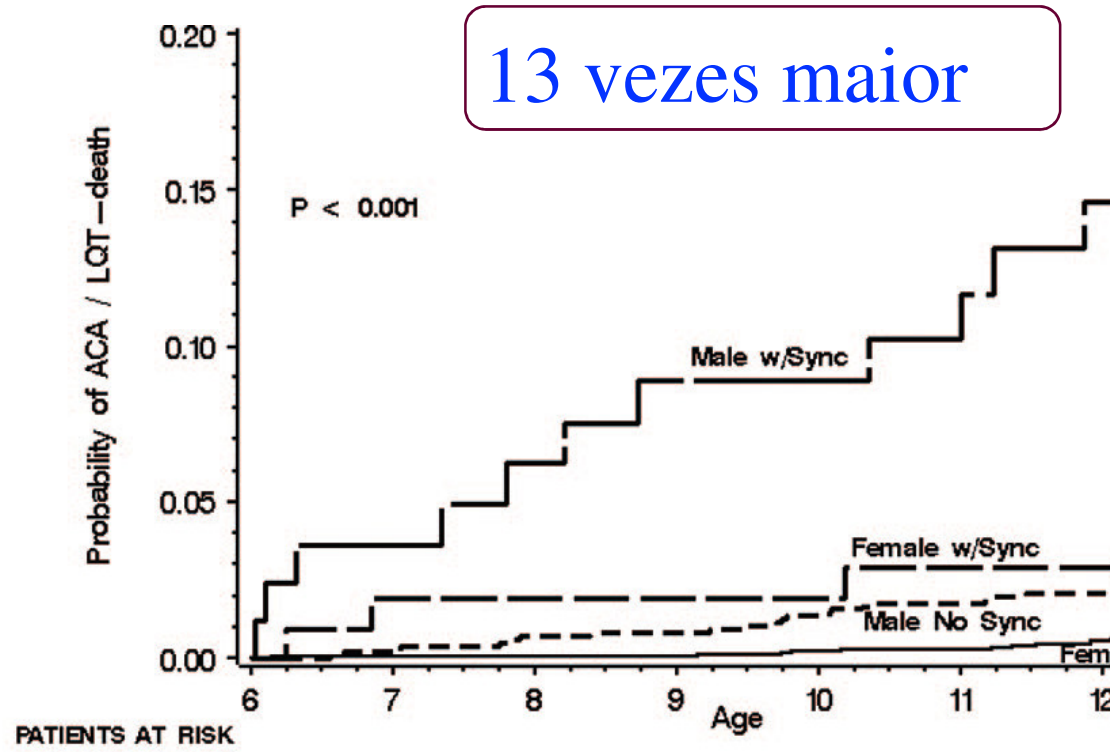
e

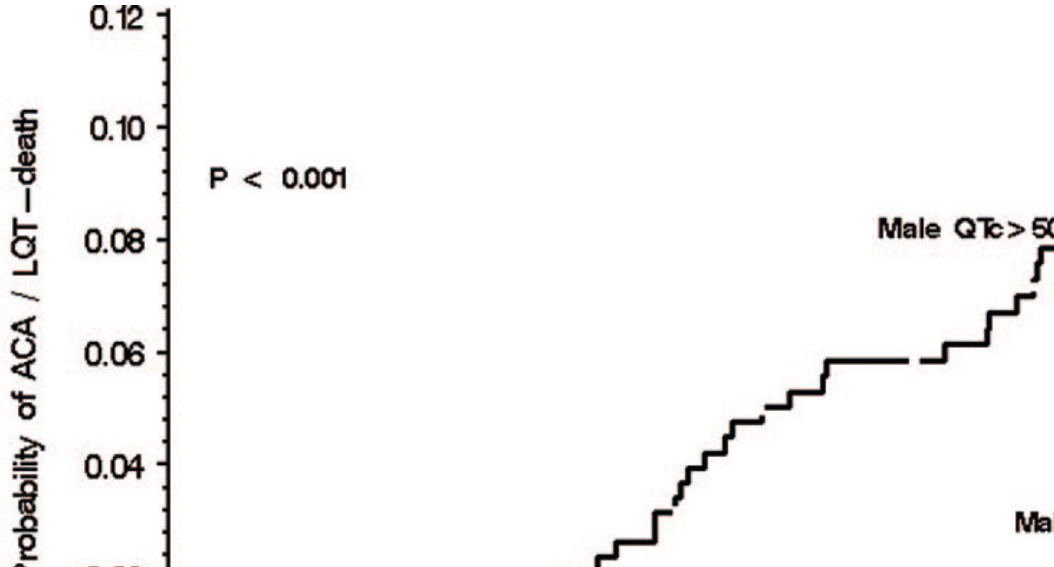
< 0.001

5 X 1



13 vezes maior





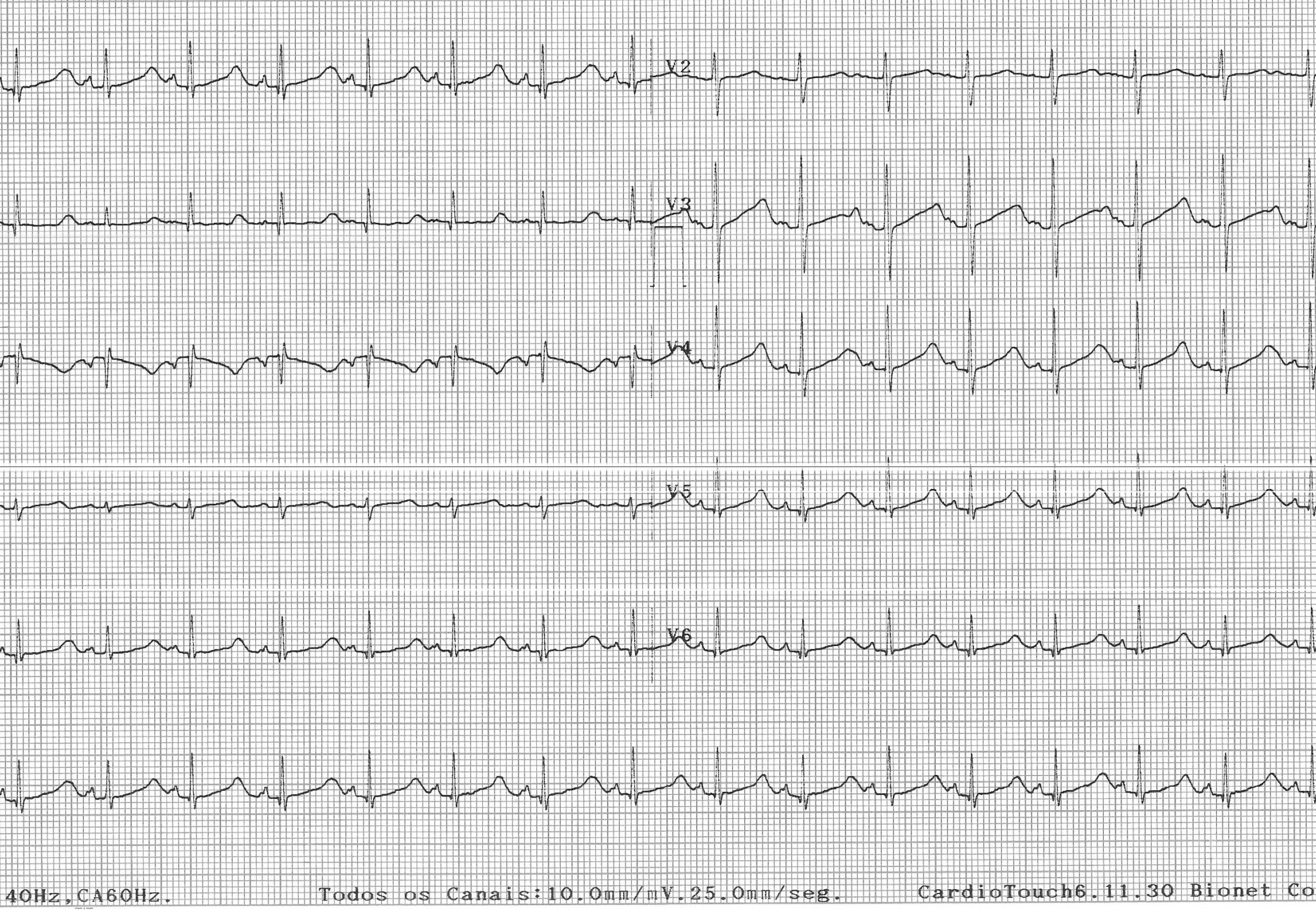
Tratamento

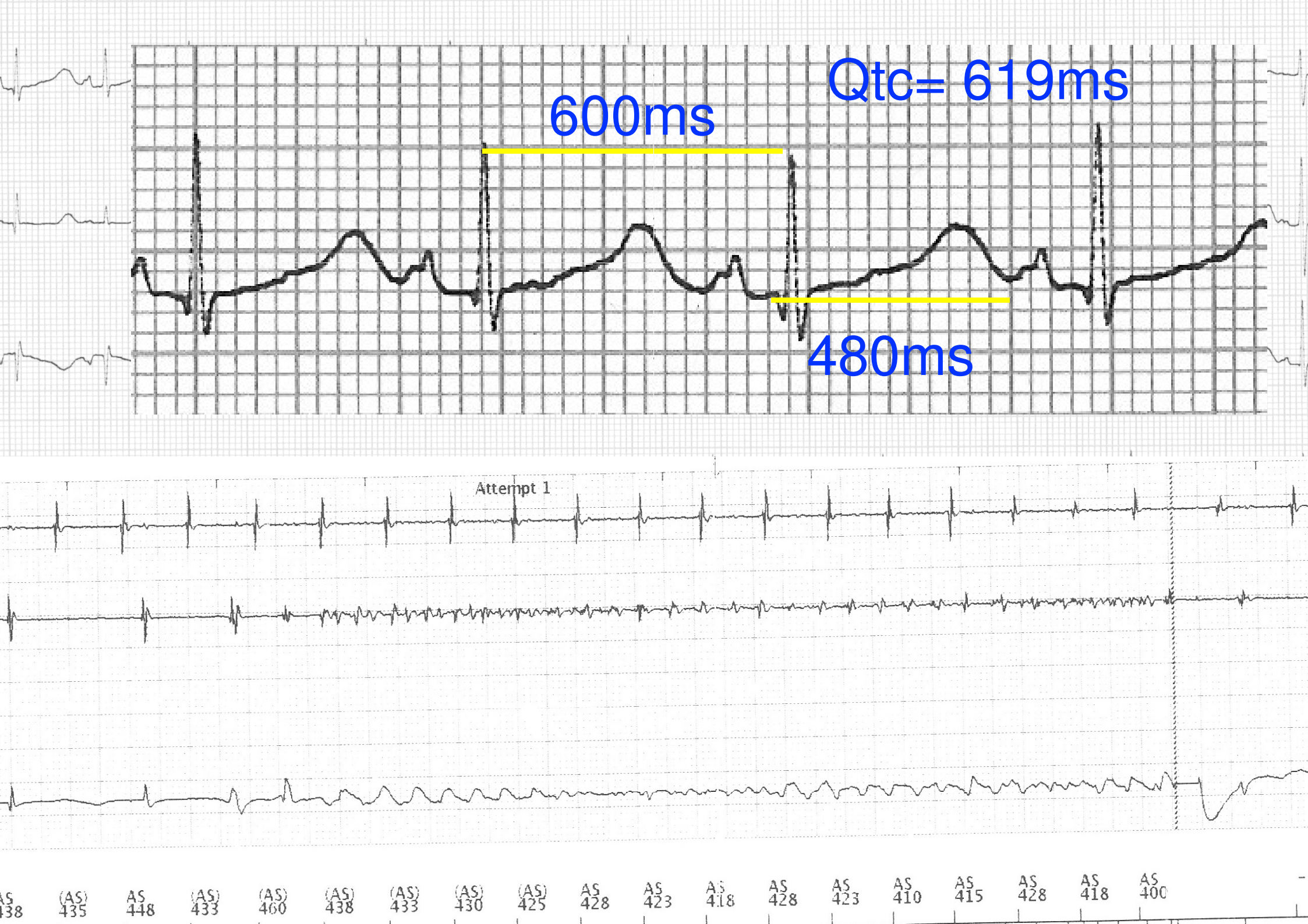
Intervenção anti-adrenérgica **(LQT1 e 2)**

- Beta-bloqueador (propranolol , nadolol, atenolol)
- Simpatectomia

Bloqueadores de canais de sódio **(LQT3)**

- Mexiletine e flecainide


V2
V3
V4
V5
V6
40Hz,CA60Hz.
Todos os Canais:10.0mm/mV.25.0mm/seg.
CardioTouch6.11.30 Bionet Co


600ms
Qtc= 619ms
480ms
Attempt 1
(AS) 435
AS 448
(AS) 433
(AS) 460
(AS) 438
(AS) 433
(AS) 430
(AS) 425
AS 428
AS 423
AS 418
AS 428
AS 423
AS 410
AS 415
AS 428
AS 418
AS 400

Síndrome QT curto

Autossômico dominante com baixo grau de penetrância

Predominio do sexo masculino

30% dos paciente podem apresentar FA

Morte súbita por Taquicardia Ventricular Polimórfica.

y Journal 2013, Vol. 20, No. 5, pp. 464–471

Recommendations	Class[a]	Level[b]	Ref.[c]
QTS is diagnosed in the presence of a QTc ≤340 ms.	I	C	This panel of experts
QTS should be considered in the resence of a QTc ≤360 ms and one or nore of the following: a) A confirmed pathogenic mutation b) A family history of SQTS c) A family history of sudden death at age <40 years d) Survival from a VT/VF episode in the absence of heart disease.	IIa	C	This panel of experts

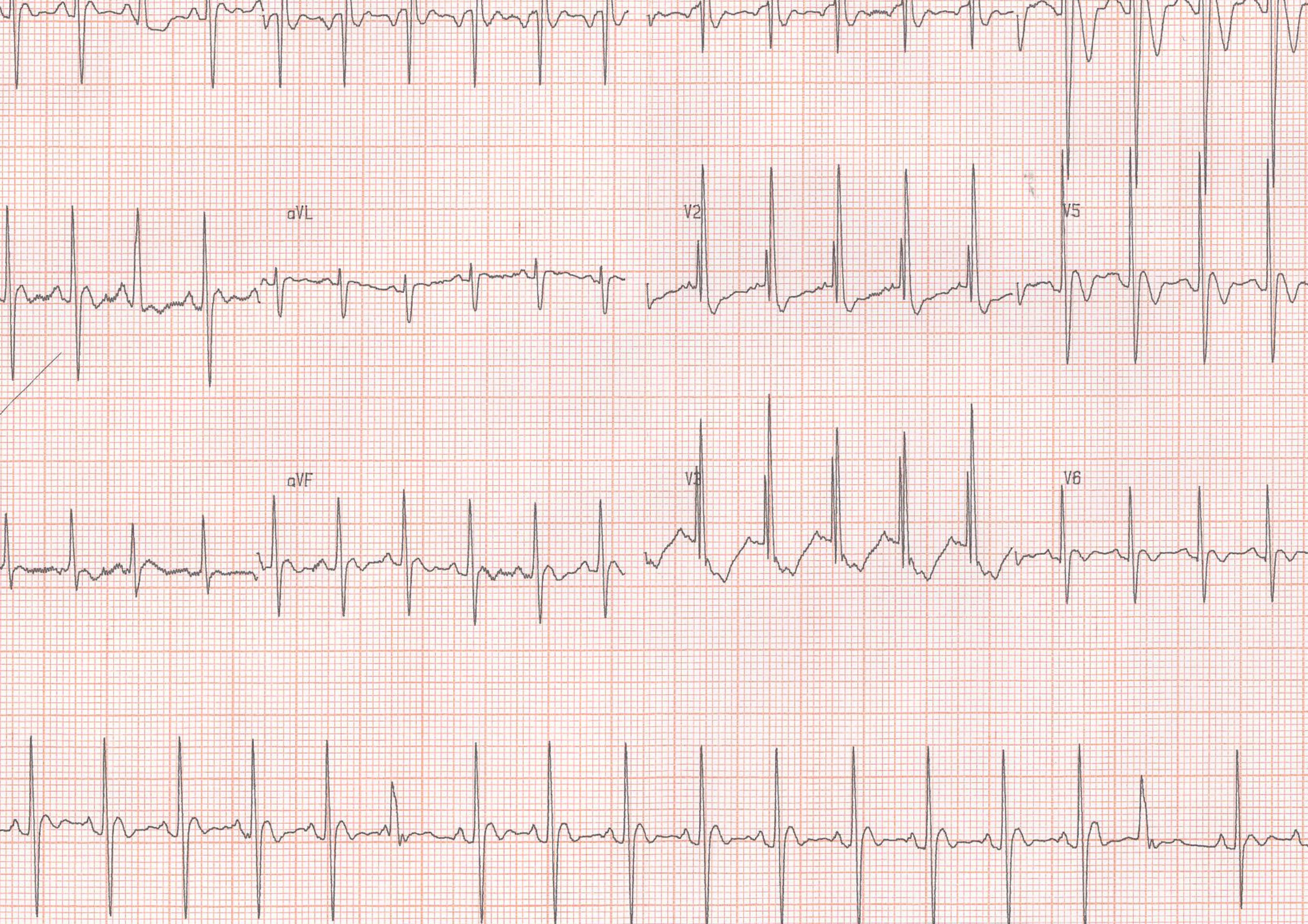
Síndrome QT curto

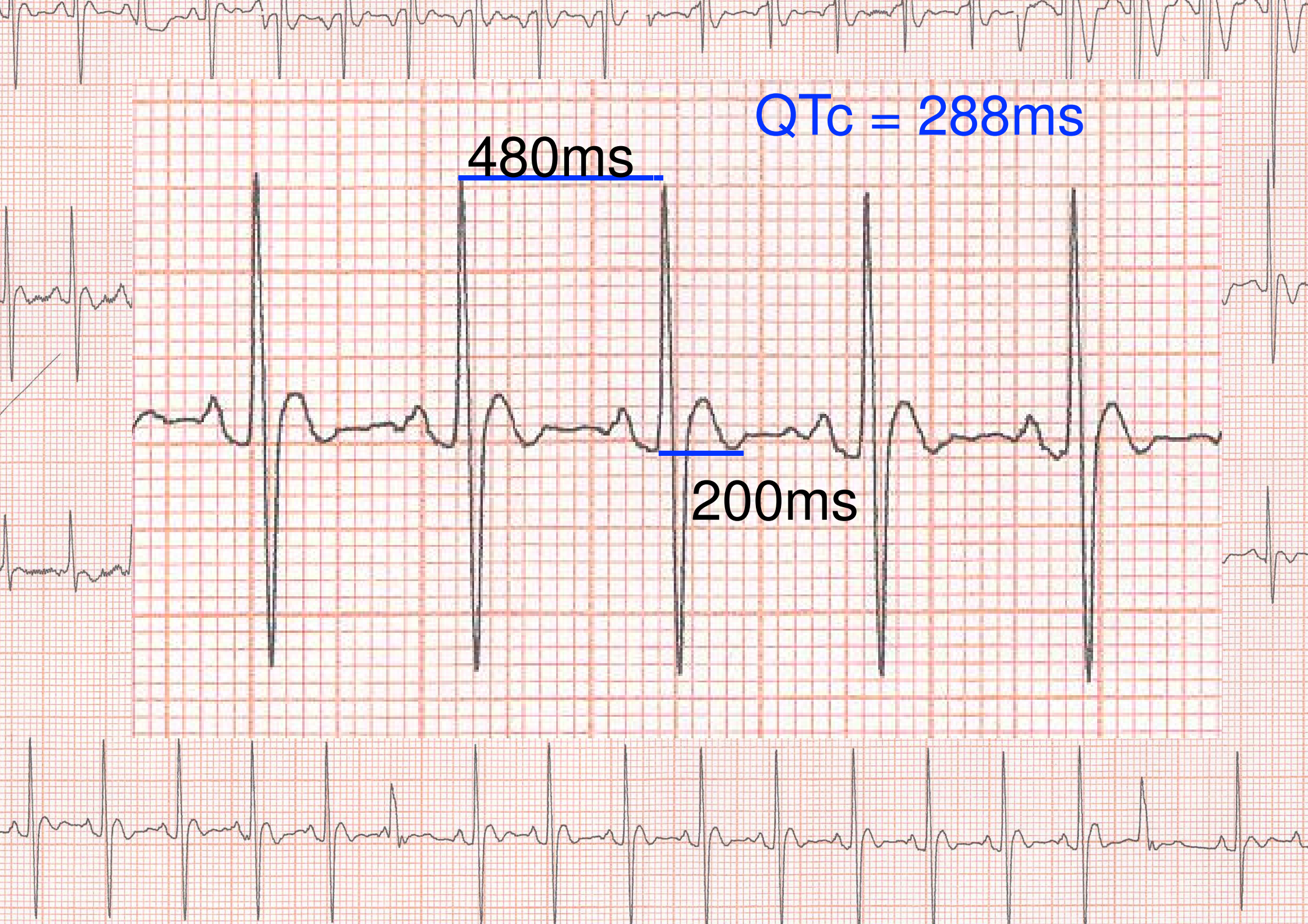
Pico de incidência de PCR no primeiro ano de vida (4%).

Apresentam 1,3% de risco de MSC entre 20 e 4 anos de idade.

Table 3 Frequency of Culprit Genetic Mutation

SQTS Subtype	Culprit Gene	Reported Mutation(s)
SQT1	*KCNH2*	N558K
		E50D
		R1135H
SQT2	*KCNQ1*	V307L
		V141M*
SQT3	*KCNJ2*	D172N
Genotype unknown	—	—


aVL
V2
V5
aVF
V3
V6


QTc = 288ms
480ms
200ms

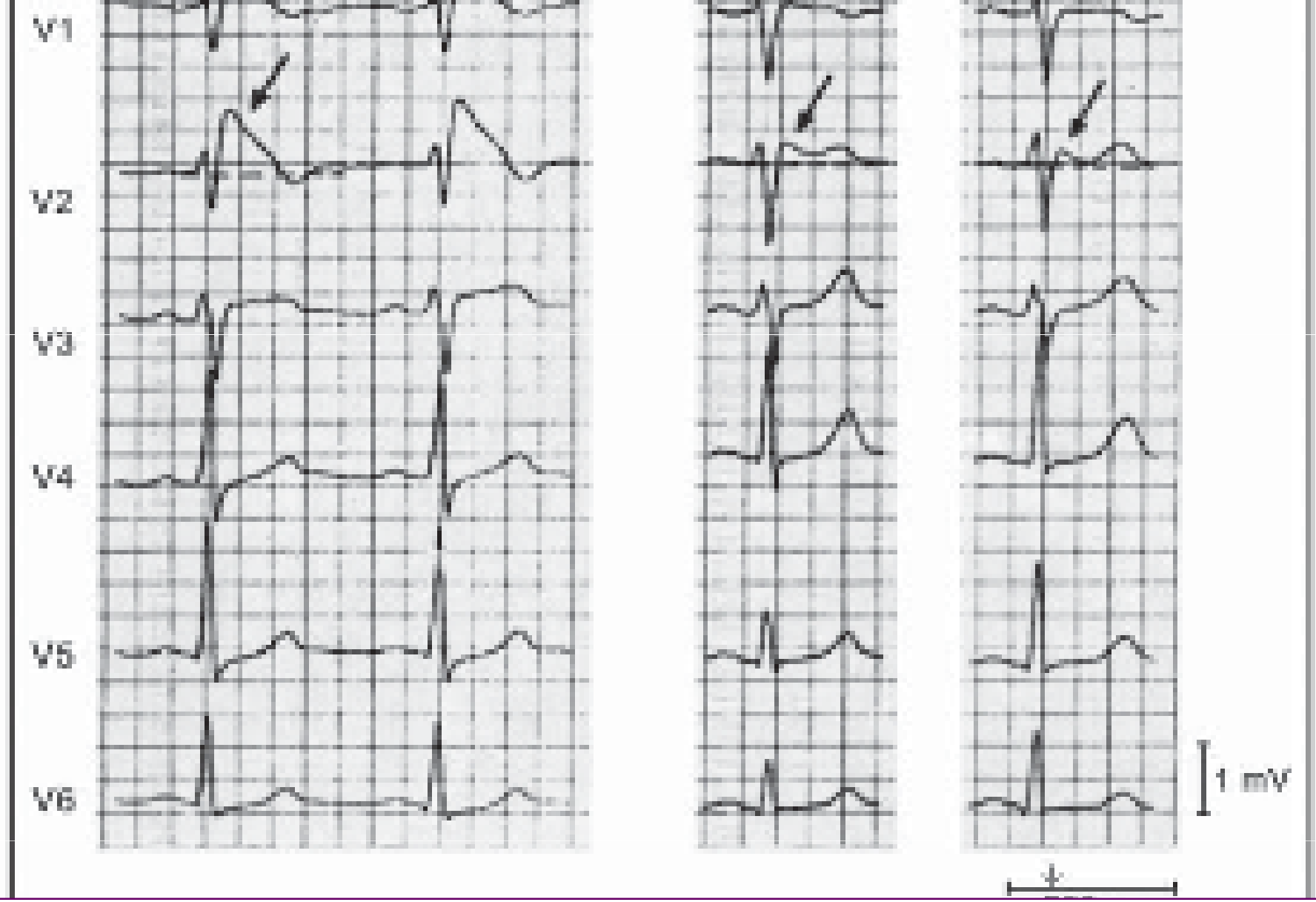
Síndrome QT curto

TRATAMENTO:

- FARMACOLÓGICO X CDI

Síndrome de Brugada

- Autossômica dominante
- Mutação do Gene SCN5A
- A mutação neste gene esta presente em 20-30% dos casos



agnostic Criteria for Brugada Syndrome (From 1st Consensus Document) ST-Segment Abnormalities in Leads V1-V

	Type 1	Type 2	Type 3
oint	≥2 mm	≥2 mm	≥2 mm
ave	Negative	Positive or biphasic	Positive

Recommendations	Class[a]	Level[b]	Ref.[c]
Brugada syndrome is diagnosed in patients with ST-segment elevation with type 1 morphology $\geq$2 mm in one or more leads among the right precordial leads V1 and/or V2 positioned in the second, third, or fourth intercostal space, occurring either spontaneously or after provocative drug test with intravenous administration of sodium channel blockers (such as ajmaline, flecainide, procainamide or pilsicainide).	I	C	This panel of experts

Síndrome de Brugada

Prevalência de 0,0098% na população pediátrica

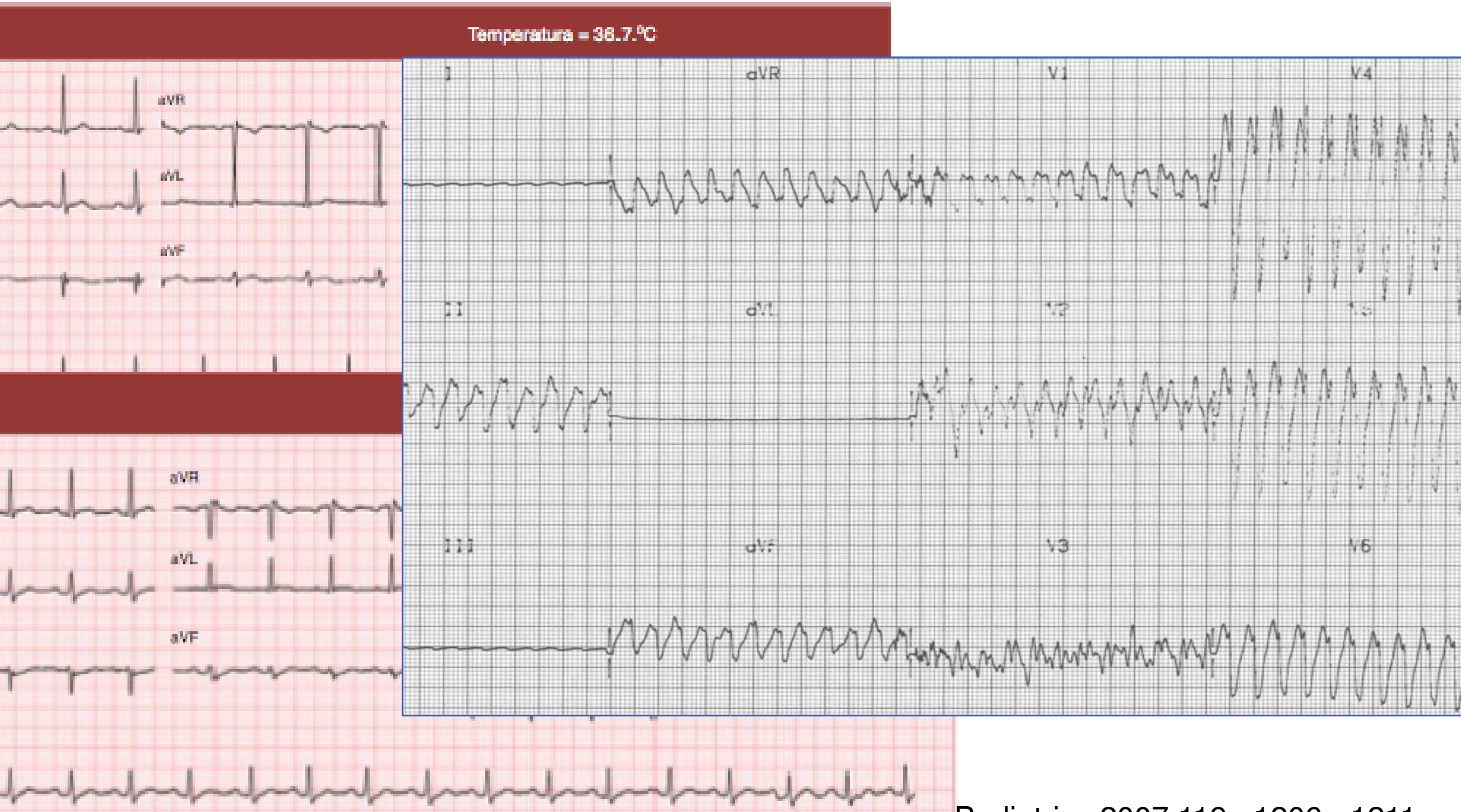
Prevalencia de sexo ?

77% dos doentes a PCR é a primeira manifestação d
doença.

13% dos pacientes podem apresentar FA ou Flutter
Atrial

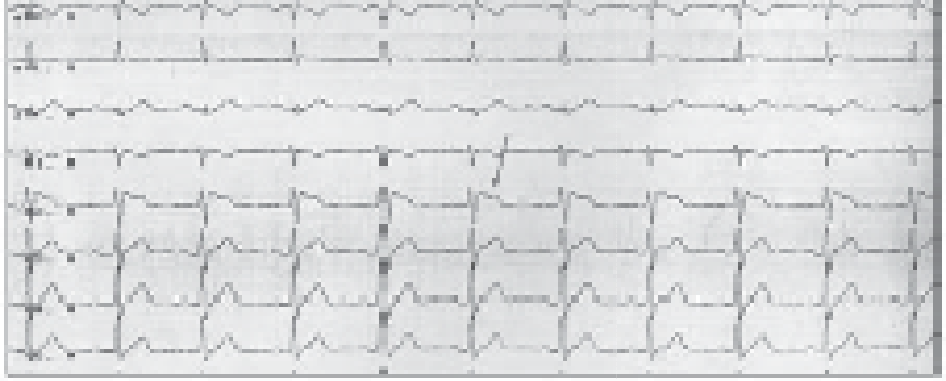
006;29:1130-1159

BrS e Síndrome Febril

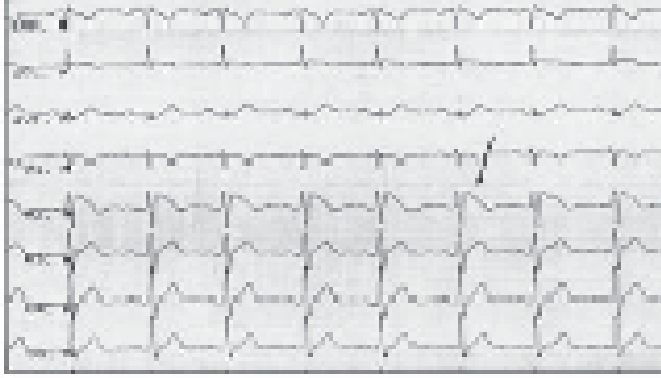


nmic drugs
annel blockers
C drugs (Encainide,[3,15,142
nide,[146,205] Propafenone[21
A drugs (Ajmaline,[2,211] Pro
yramide,[4,10] Cibenzoline[212
annel blockers
ni
ers
co inloxacab[214]
al drugs
annel blockers
ne, dilbazem

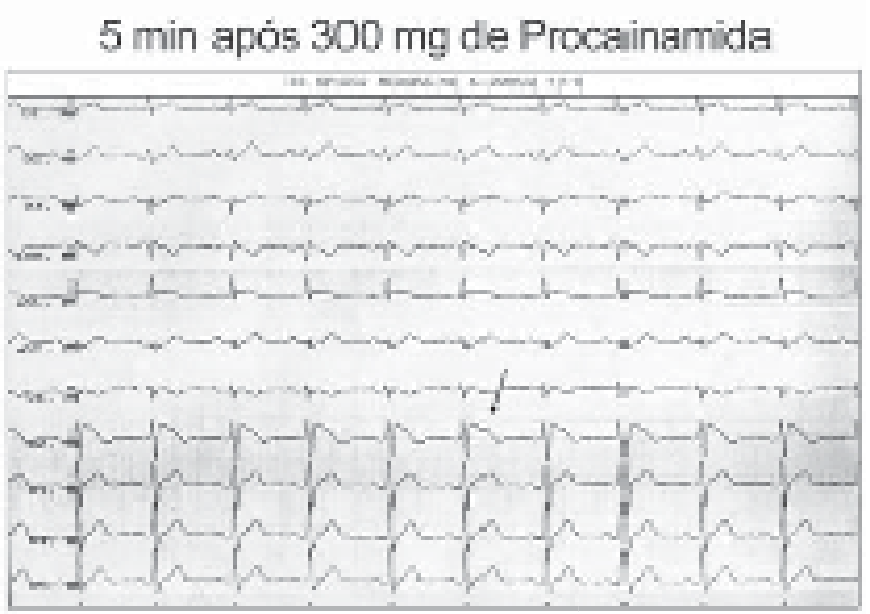
de dinitrate, nitroglycerine[215]
ne openers
di
pic drugs
antidepressants[216]
yline,[217,218] Nortriptyline,[151]
ramine[130]
clic antidepressants
ine[217]
niazine
razine,[217] Cyamemazine,
e serotonin reuptake inhibitor
ine[218]
137
gs
ric H1 receptor antagonists
ydrinate[152]



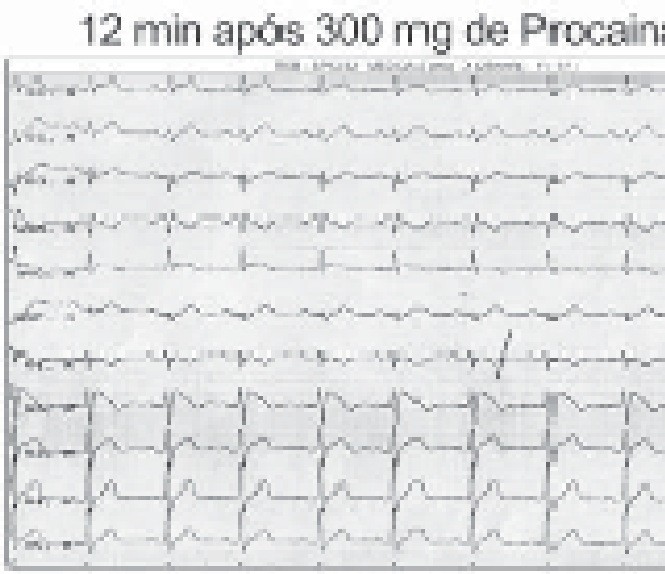
4



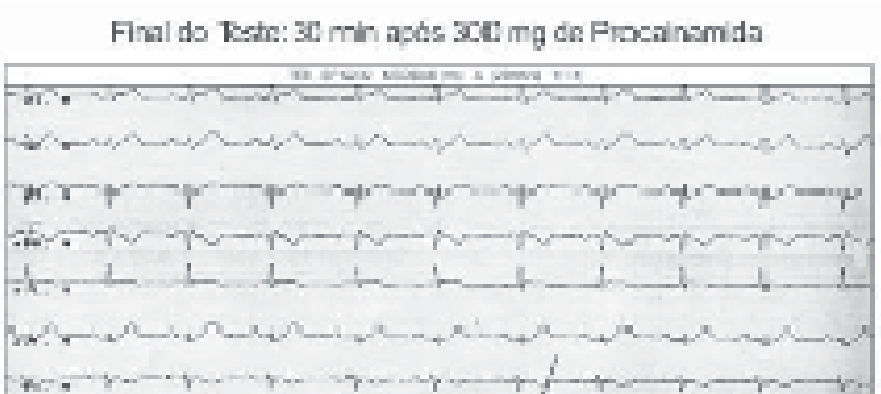
5

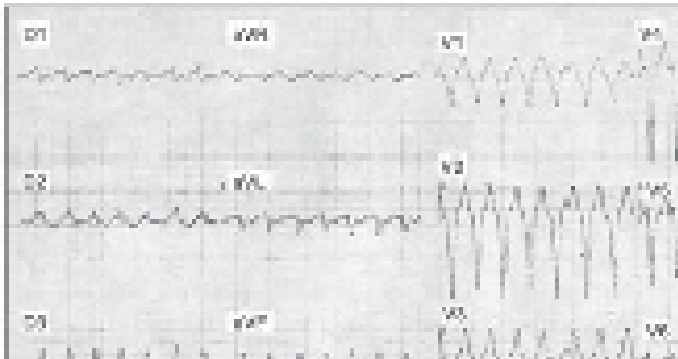


6



7





Síndrome de Brugada

Tratamento:

* CDI
* Antiarrítmicos:

Potential antiarrhythmic drugs in Brugada syndrome p

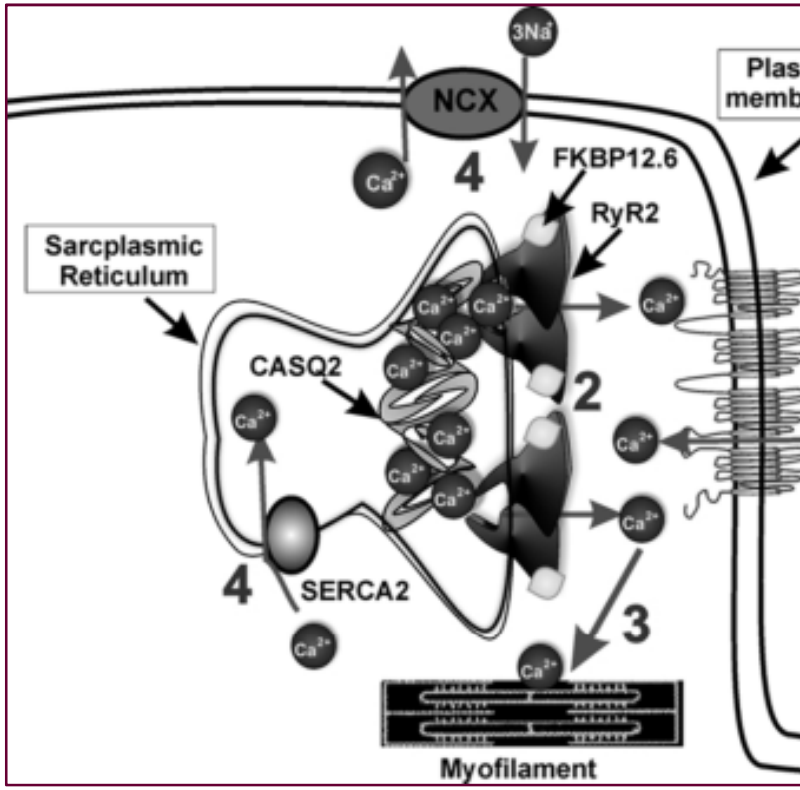
Drug category	Drug (generic)	Recommend
Antiarrhythmic drugs	Isoproterenol / Isoprenaline[15,17,113,114]*	Class I
	Orciprenaline[115]	Class IIa
	Quinidine[8-10,15,116,117]†	Class I

Taquicardia Ventricular Polimórfica Catecolaminérgica

40% dos casos tem história familiar de MS

Principais mutações são nos genes:

- RyR2 (60%) - autossômica dominante
- CASQ2 (5%) - autossômica recessiva



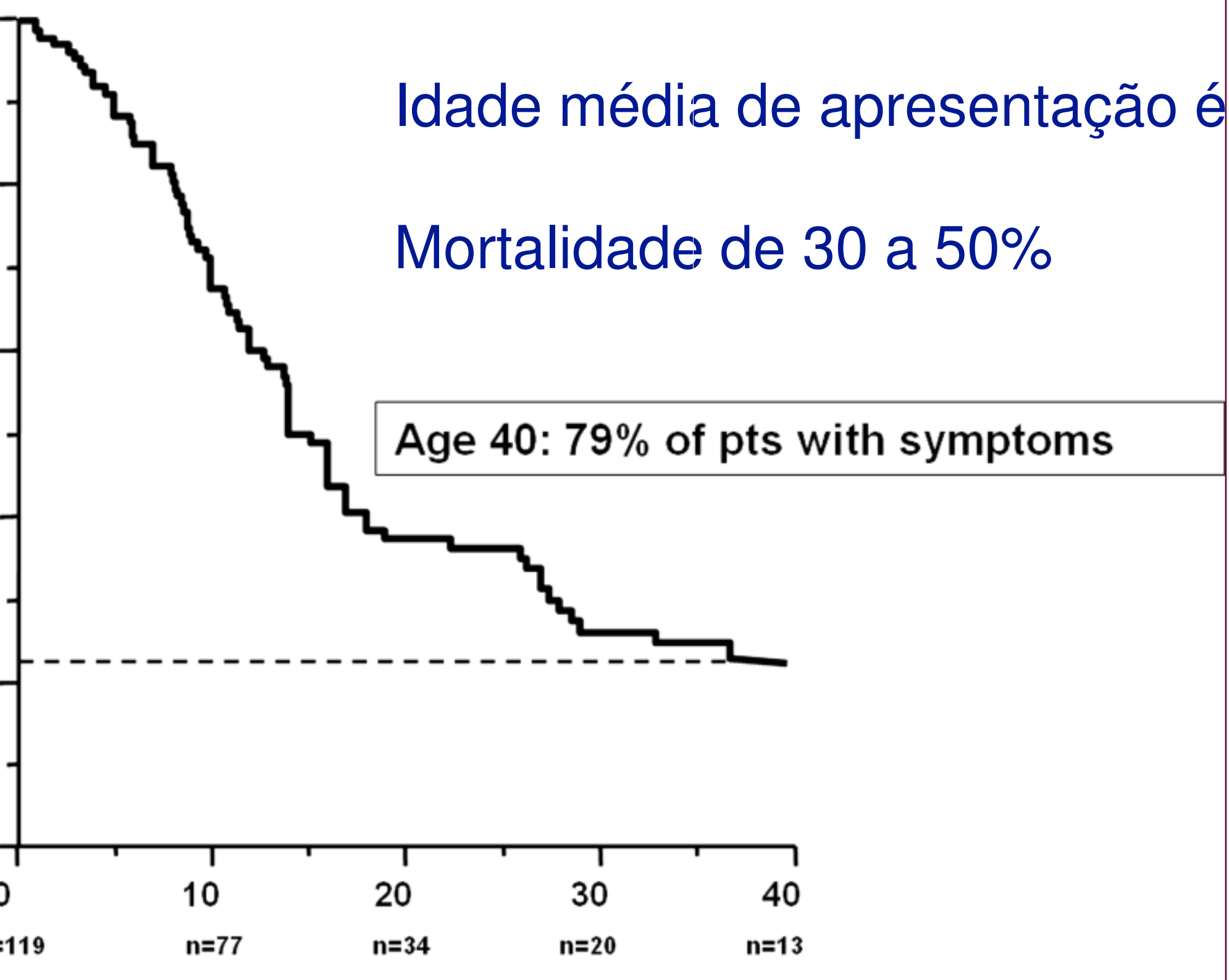
O teste genético é capaz de identificar os familiares assintomáticos porém a ausência de de mutações não exclui o diagnóstico.

Taquicardia Ventricular Polimórfica Catecolaminérgic

- Episódios sincopais são desencadeados pelo exercício físico ou estresse psicológico.
- O teste ergométrico pode induz TVP em 80%

Idade média de apresentação é **8 anc**

Mortalidade de 30 a 50%



Diagnosis of catecholaminergic polymorphic ventricular tachycardia

Recommendations	Class[a]	Level[b]	Ref.[c]
CPVT is diagnosed in the presence of a structurally normal heart, normal ECG and exercise- or emotion-induced bidirectional or polymorphic VT.	I	C	14,52, 457
CPVT is diagnosed in patients who are carriers of a pathogenic mutation(s) in the genes *RyR2* or *CASQ2*.	I	C	14,52

udden cardiac death: catecholaminergic polymorphic ventricular achycardia

	Recommendation
Primary prevention	
Beta-blockers	Class IIa
Implantable cardioverter defibrillator (ICD)	Class IIb
Secondary prevention	
ICD (plus beta-blockers)	Class I
Beta-blockers	Class IIa

Classification

Class I: Conditions for which there is evidence and/or general agreement that a given procedure or treatment is useful and effective.

Class II: Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment.

Class IIa: Weight of evidence/opinion is in favor of usefulness/efficacy.

Class IIb: Usefulness/efficacy less well established by evidence/opinion.

Class III: Conditions for which there is evidence and/or general agreement that the