Arritmias no pós operatório de cardiopatias congênitas: tratamento clínico

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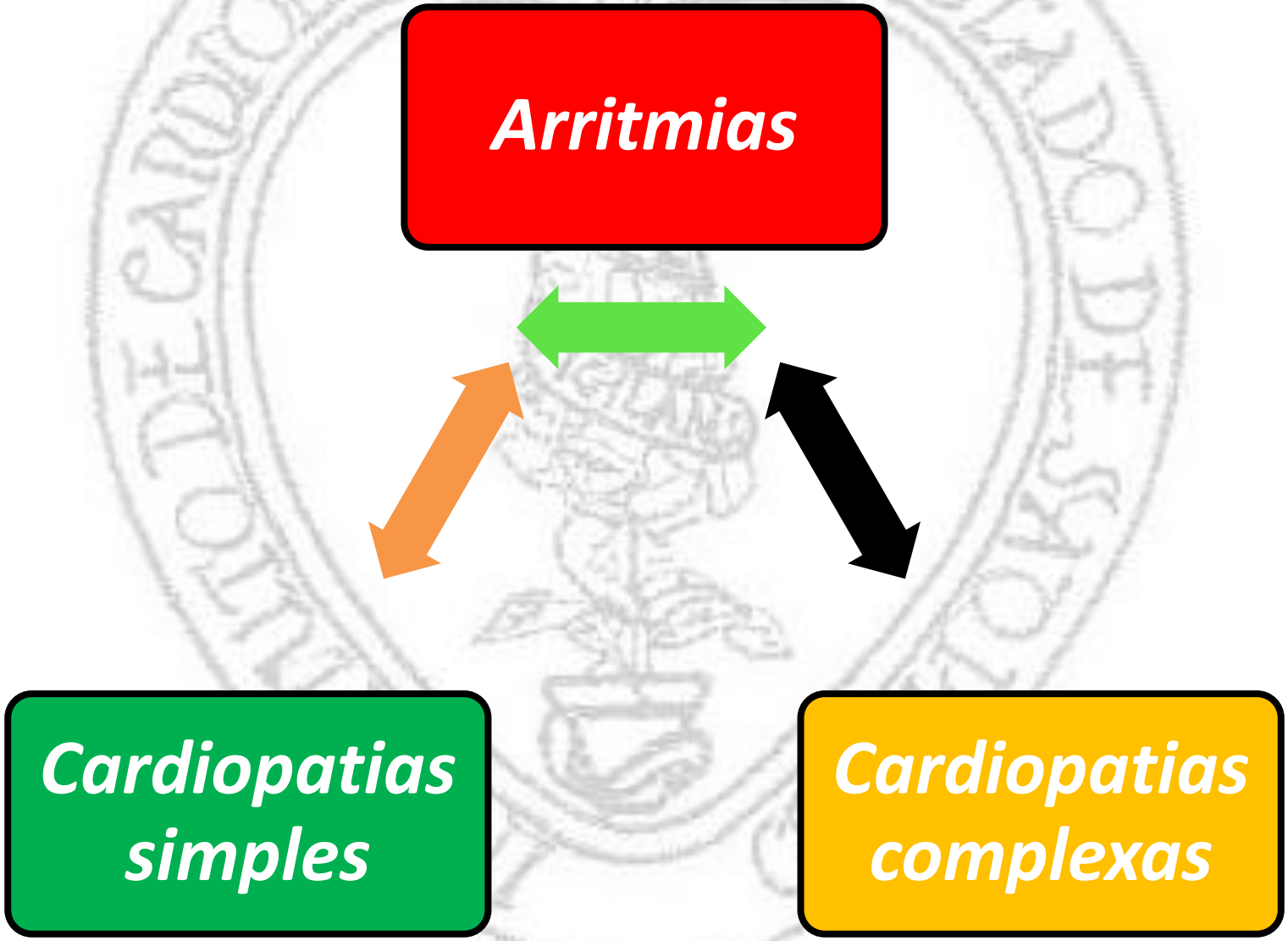
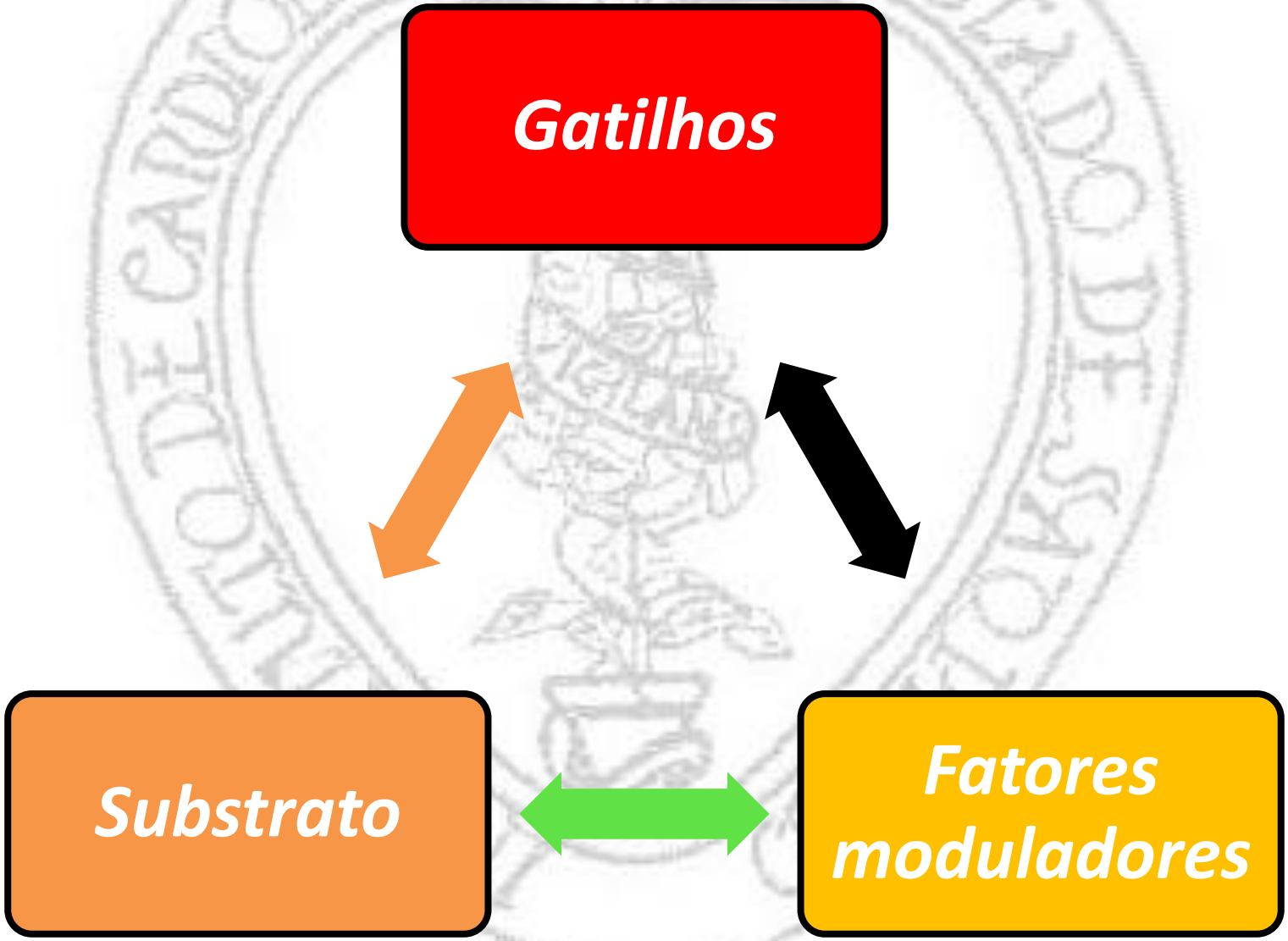
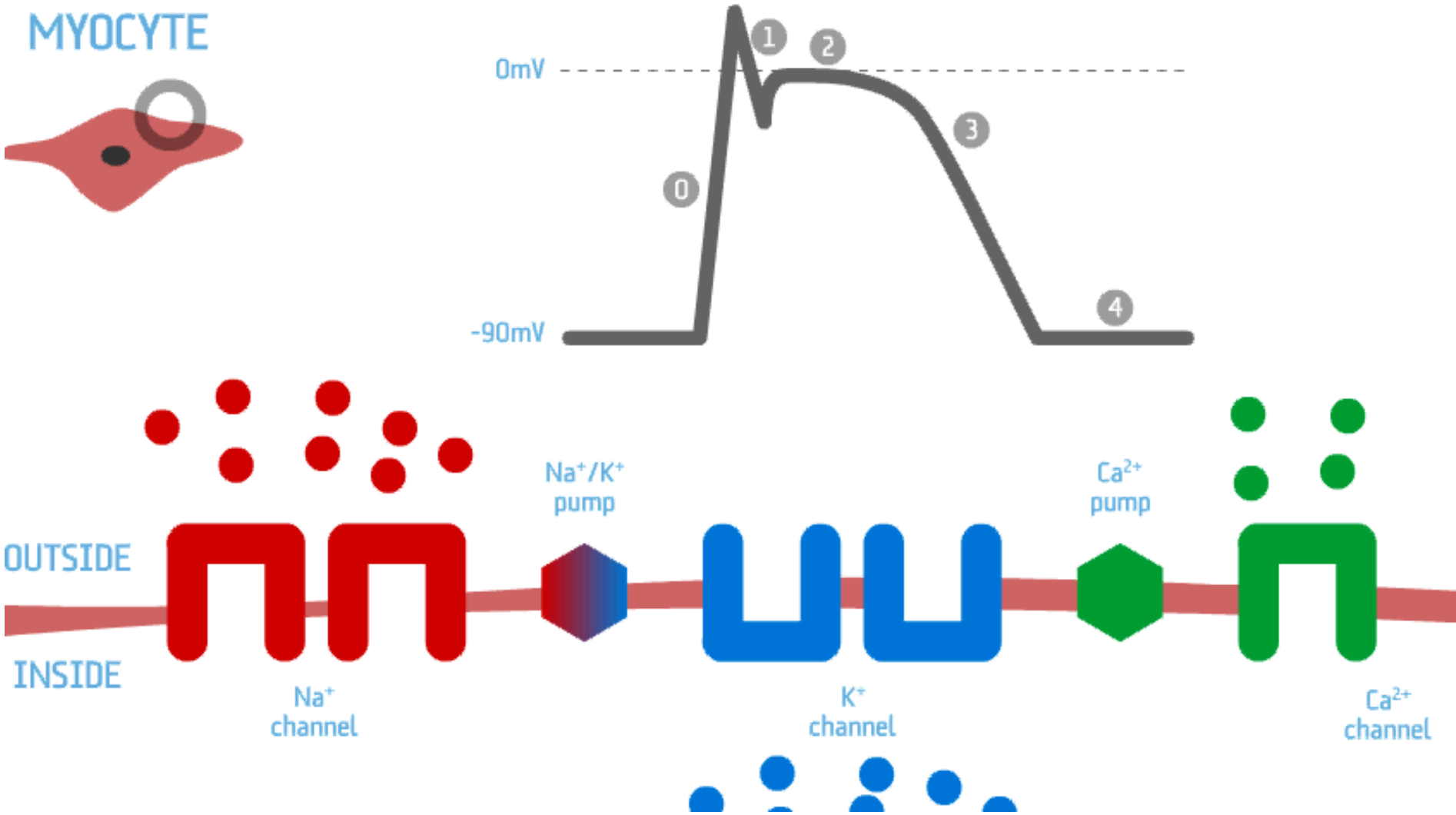
Instituto Dante Pazzanese de Cardiologia

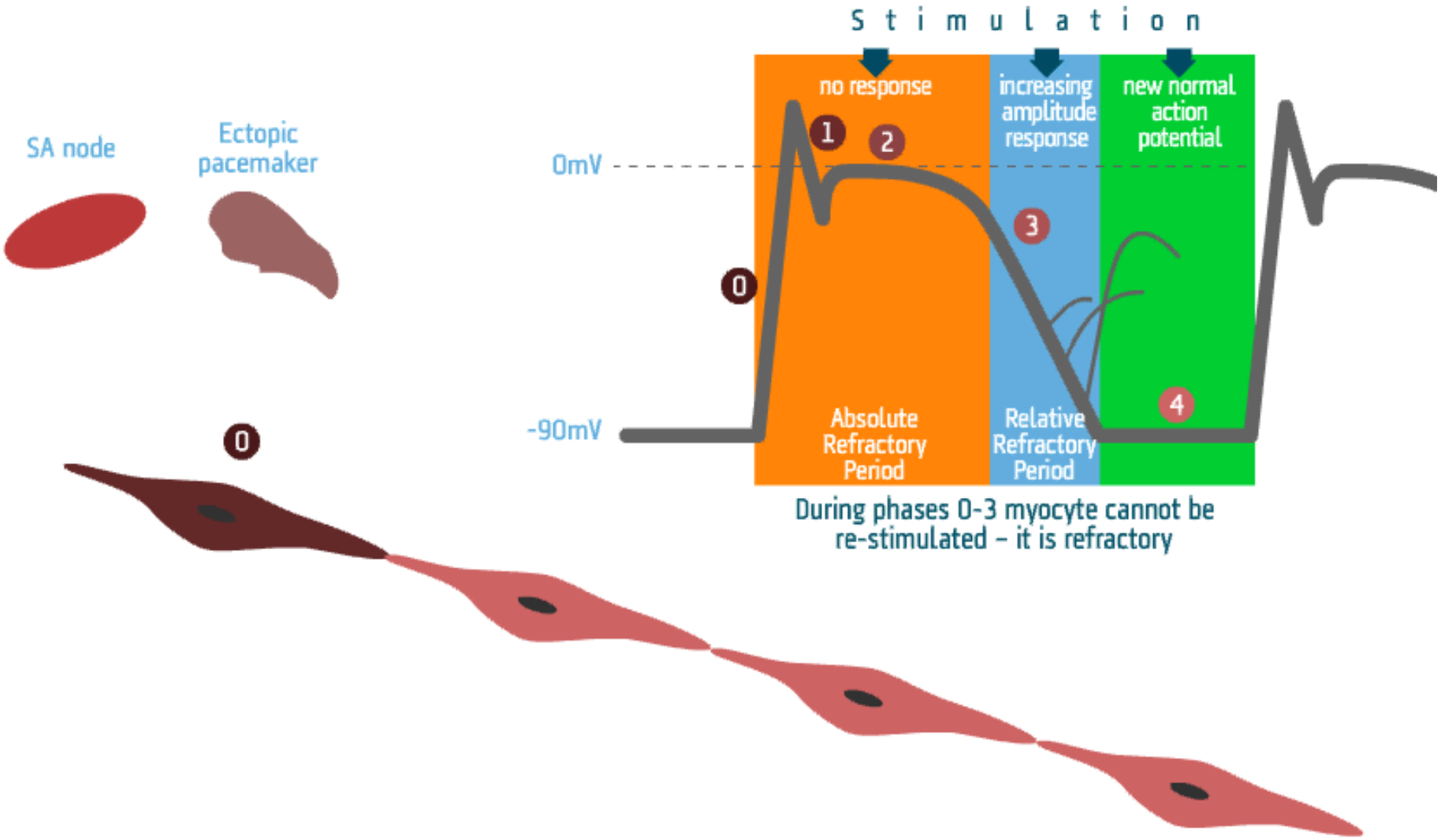
ALBERT EINSTEIN
HOSPITAL ISRAELITA

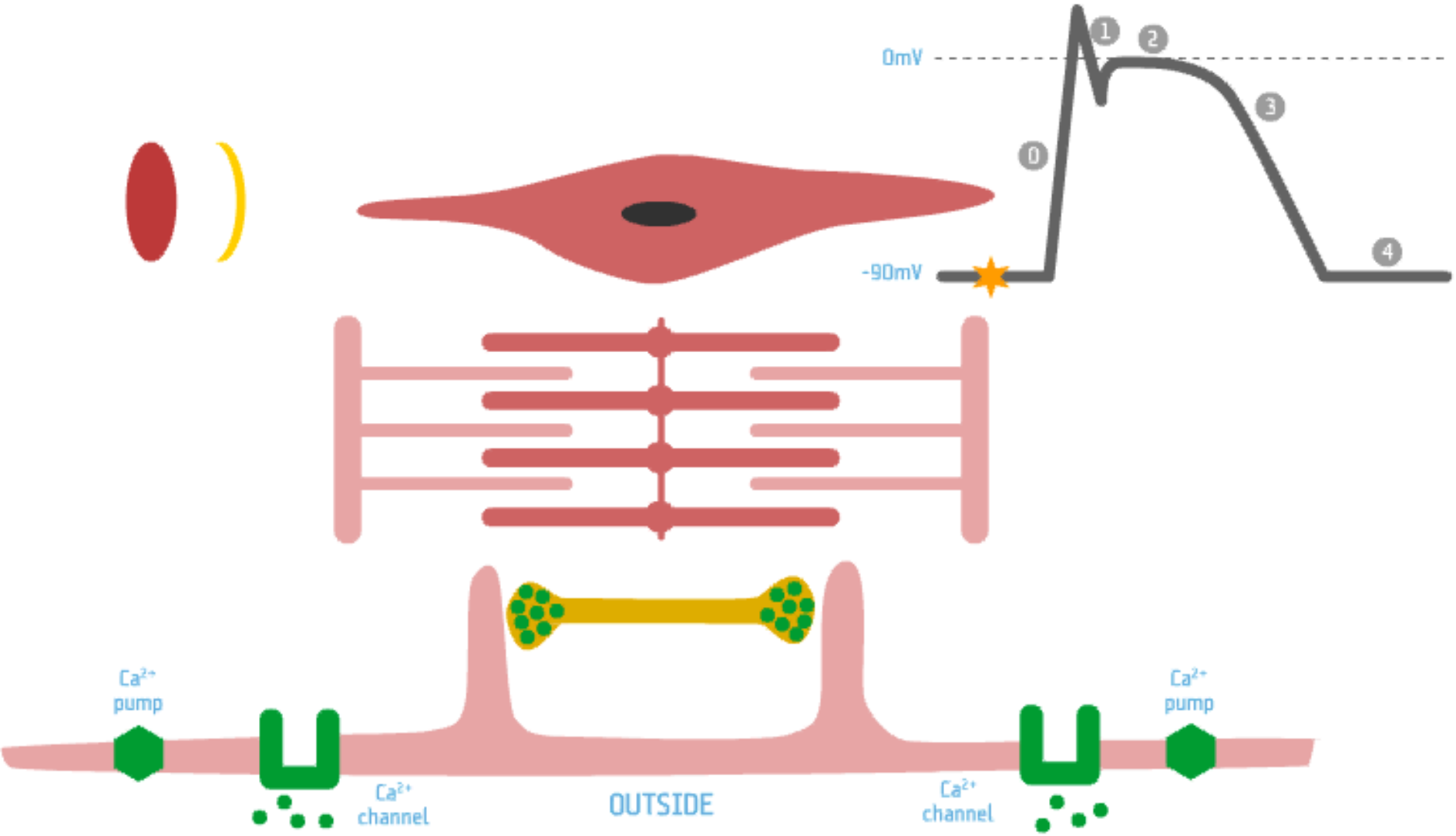
PACES

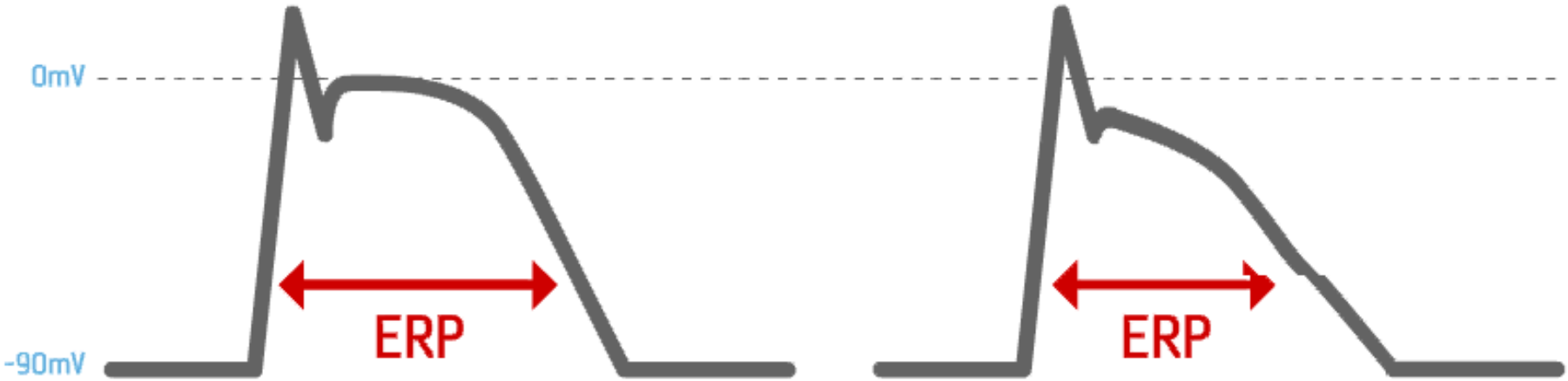

Arritmias
Cardiopatias simples
Cardiopatias complexas

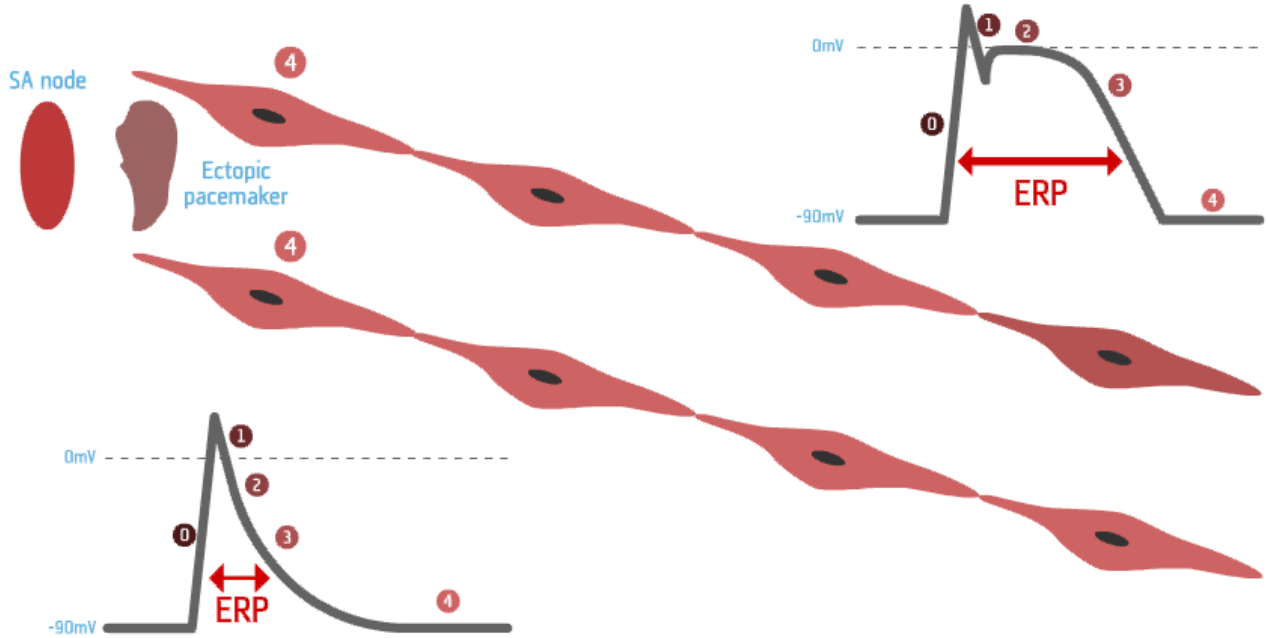

Gatilhos
Substrato
Fatores moduladores

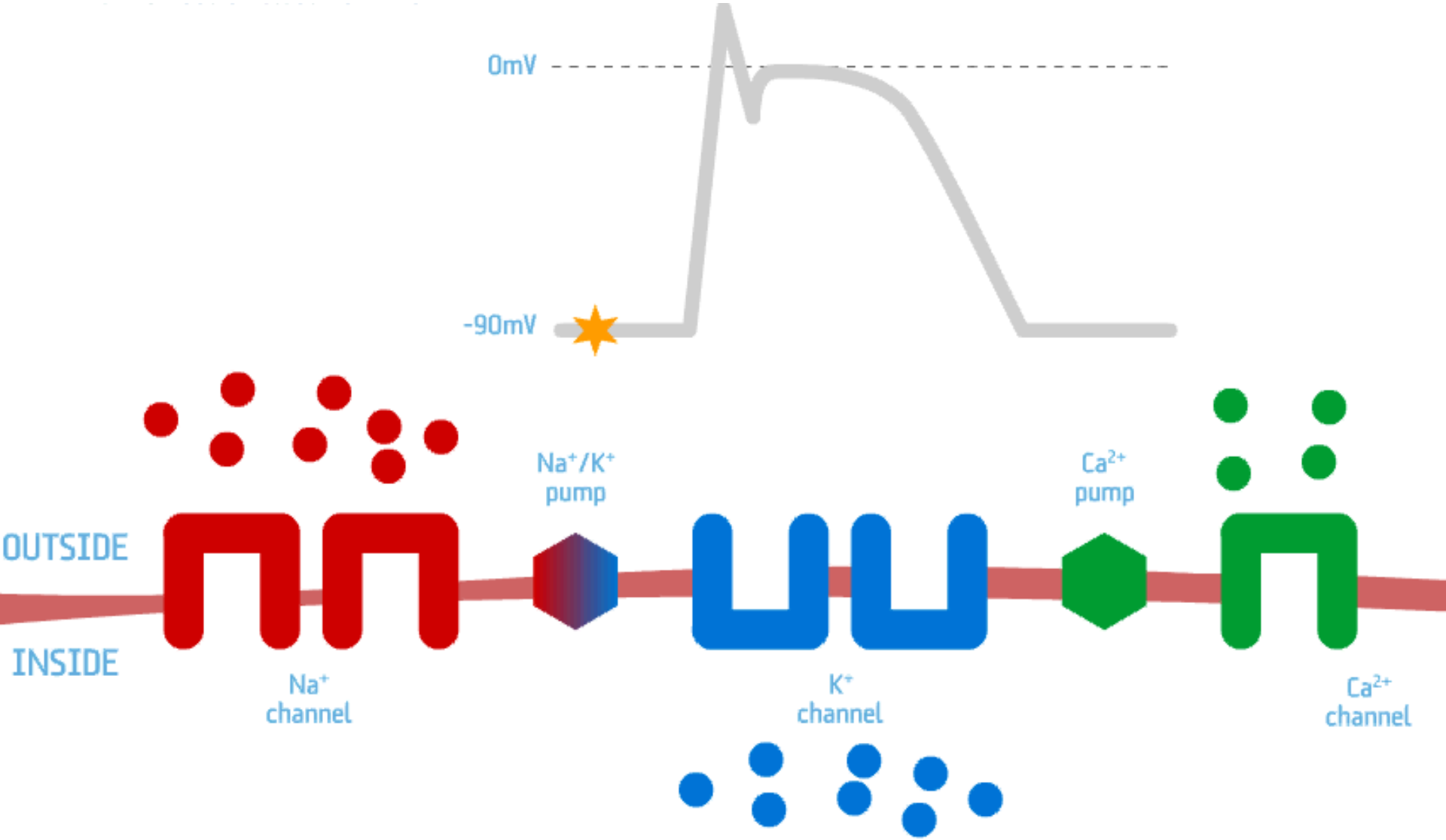

MYOCYTE
0mV
-90mV
0
1
2
3
4
Na+/K+
pump
Ca2+
pump
OUTSIDE
INSIDE
Na+
channel
K+
channel
Ca2+
channel


Stimulation
no response
increasing amplitude response
new normal action potential
SA node
Ectopic pacemaker
0mV
-90mV
0
1
2
3
4
Absolute Refractory Period
Relative Refractory Period
During phases 0-3 myocyte cannot be re-stimulated – it is refractory

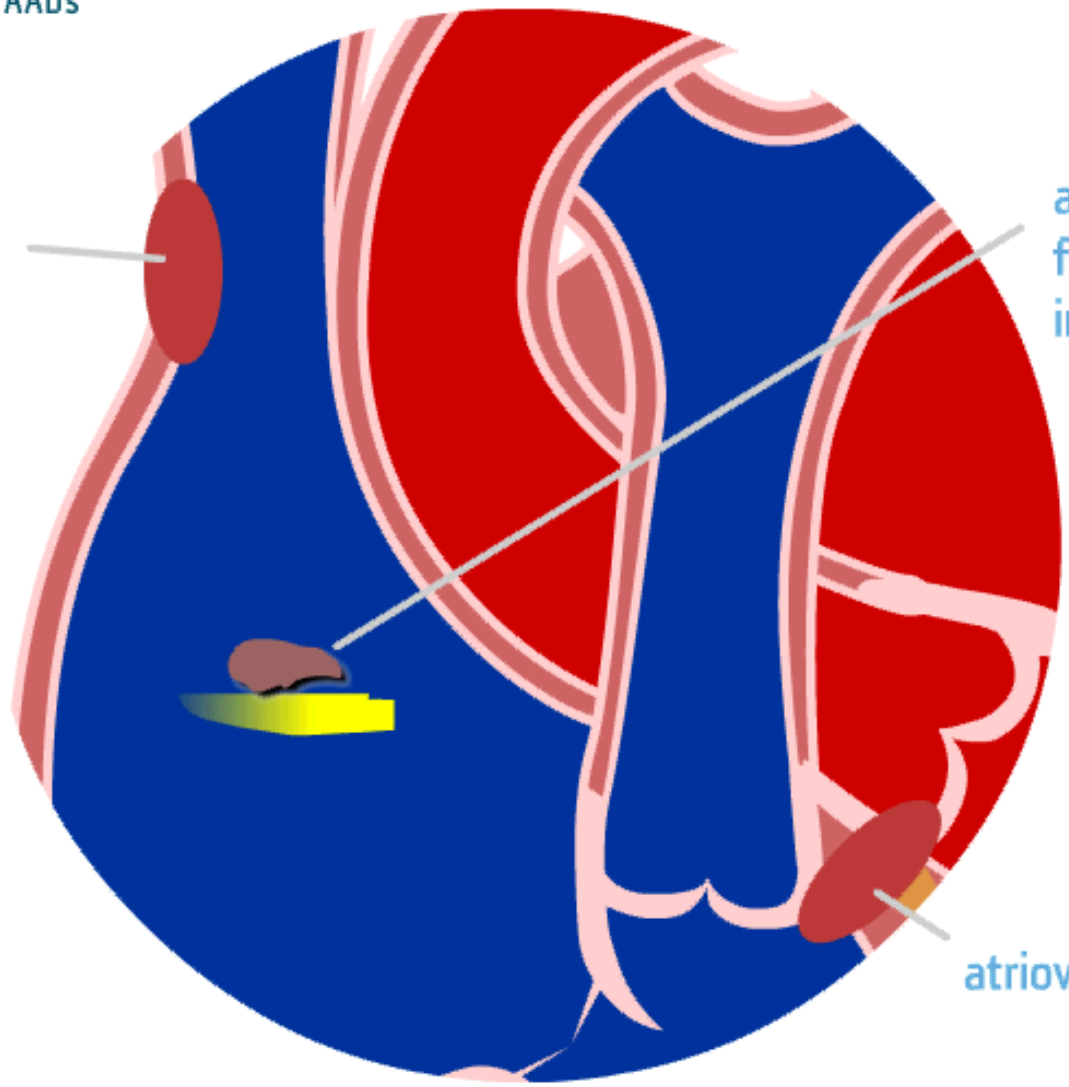

0mV
-90mV
0
1
2
3
4
Ca2+ pump
Ca2+ channel
OUTSIDE
Ca2+ channel
Ca2+ pump


0mV
-90mV
ERP
ERP

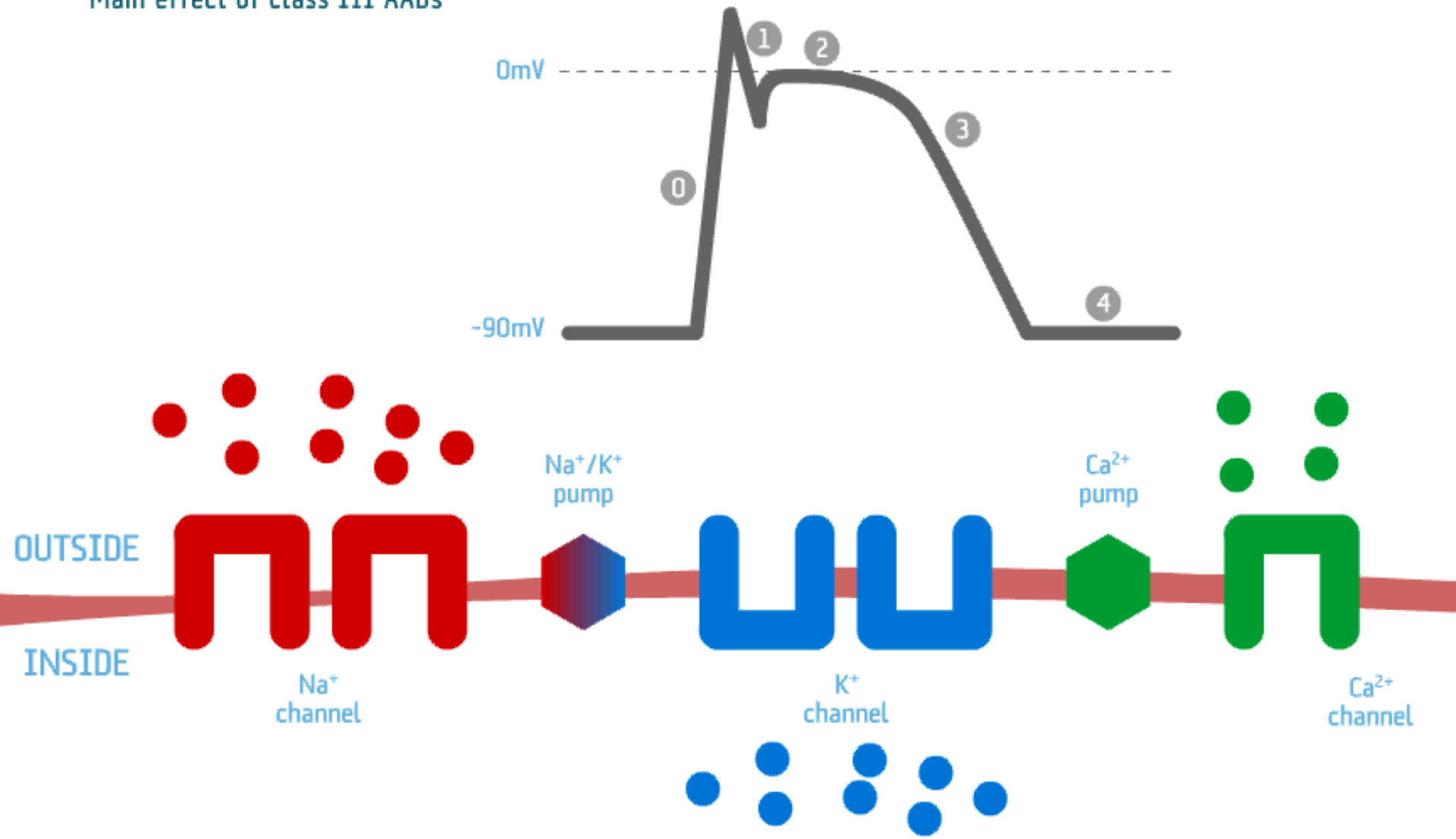

SA node
Ectopic pacemaker
0mV
-90mV
ERP
0mV
-90mV
ERP


0mV
-90mV
OUTSIDE
INSIDE
Na+/K+ pump
Ca2+ pump
Na+ channel
K+ channel
Ca2+ channel

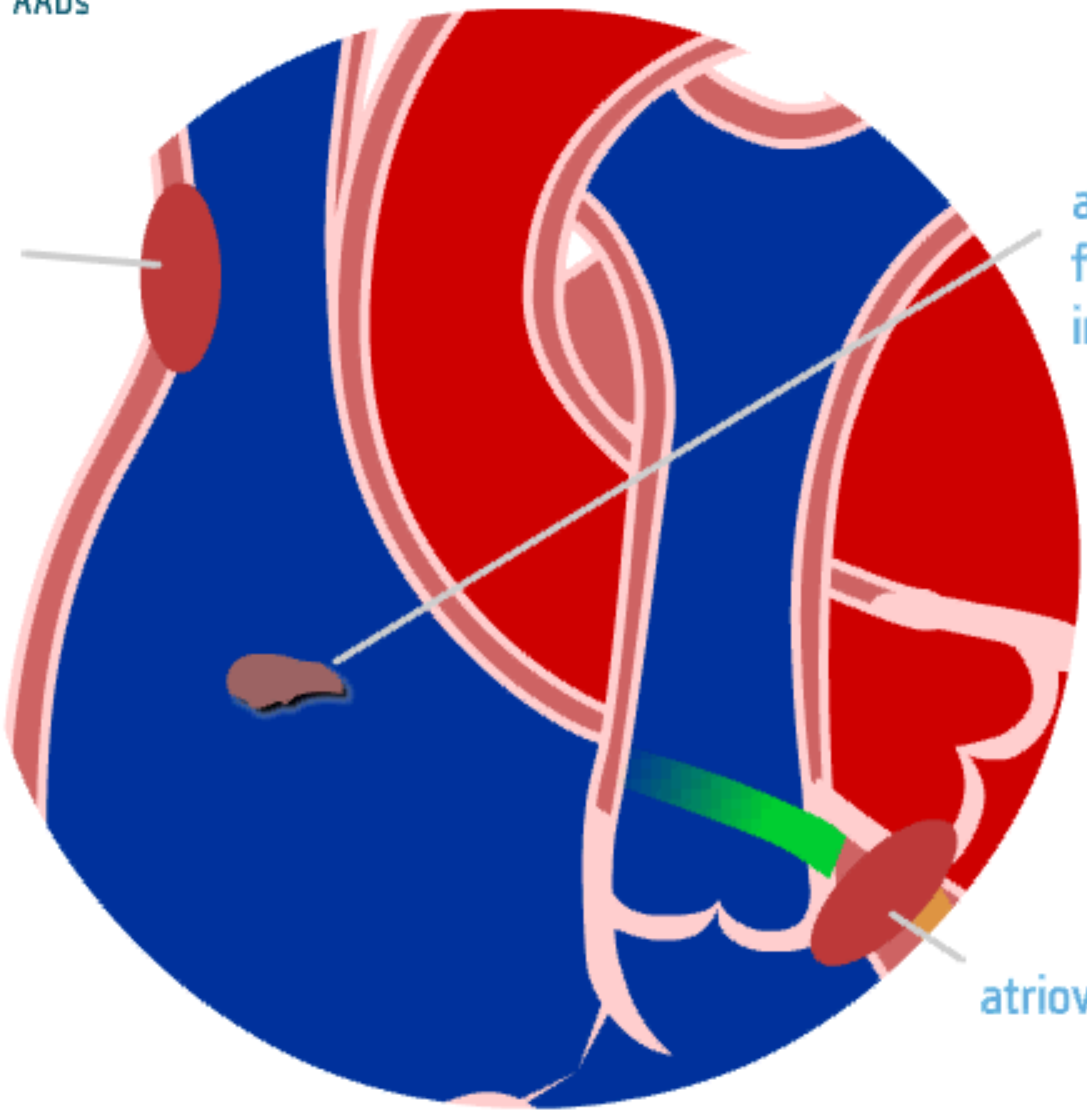
Main effect of class Ic AADs



Main effect of class III AADs



Main effect of class III AADs



Causas de morte nas cardiopatias congênitas

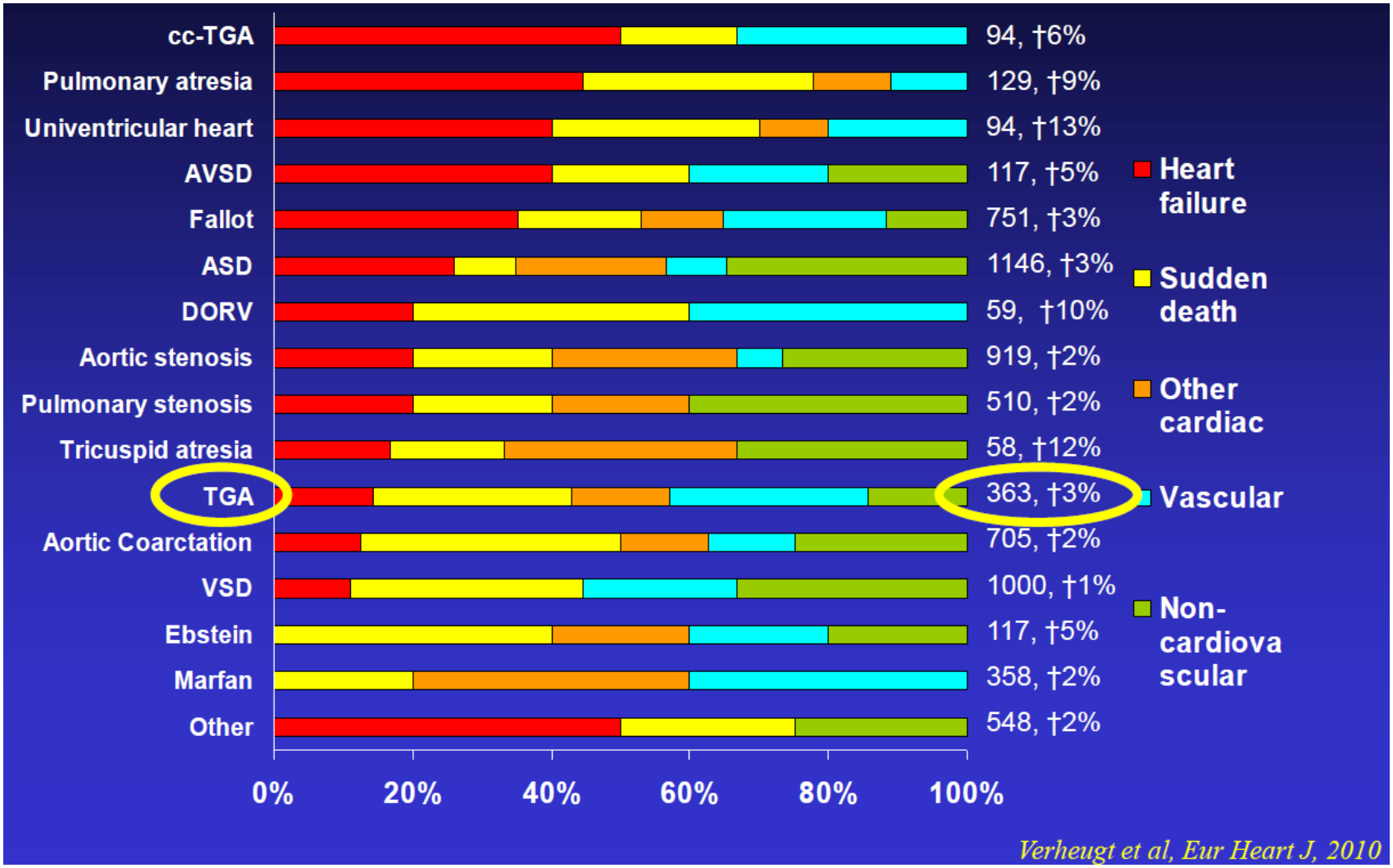
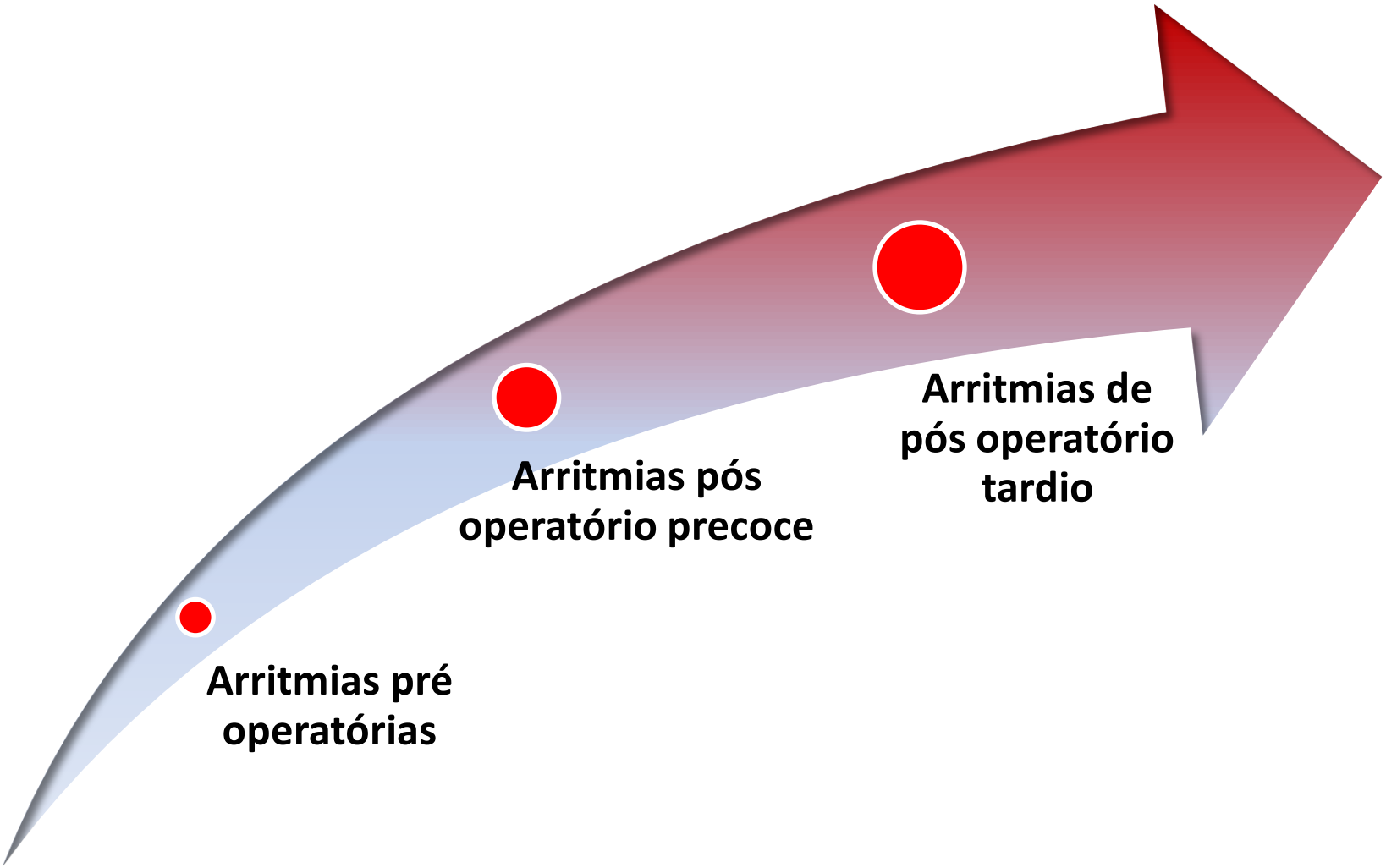


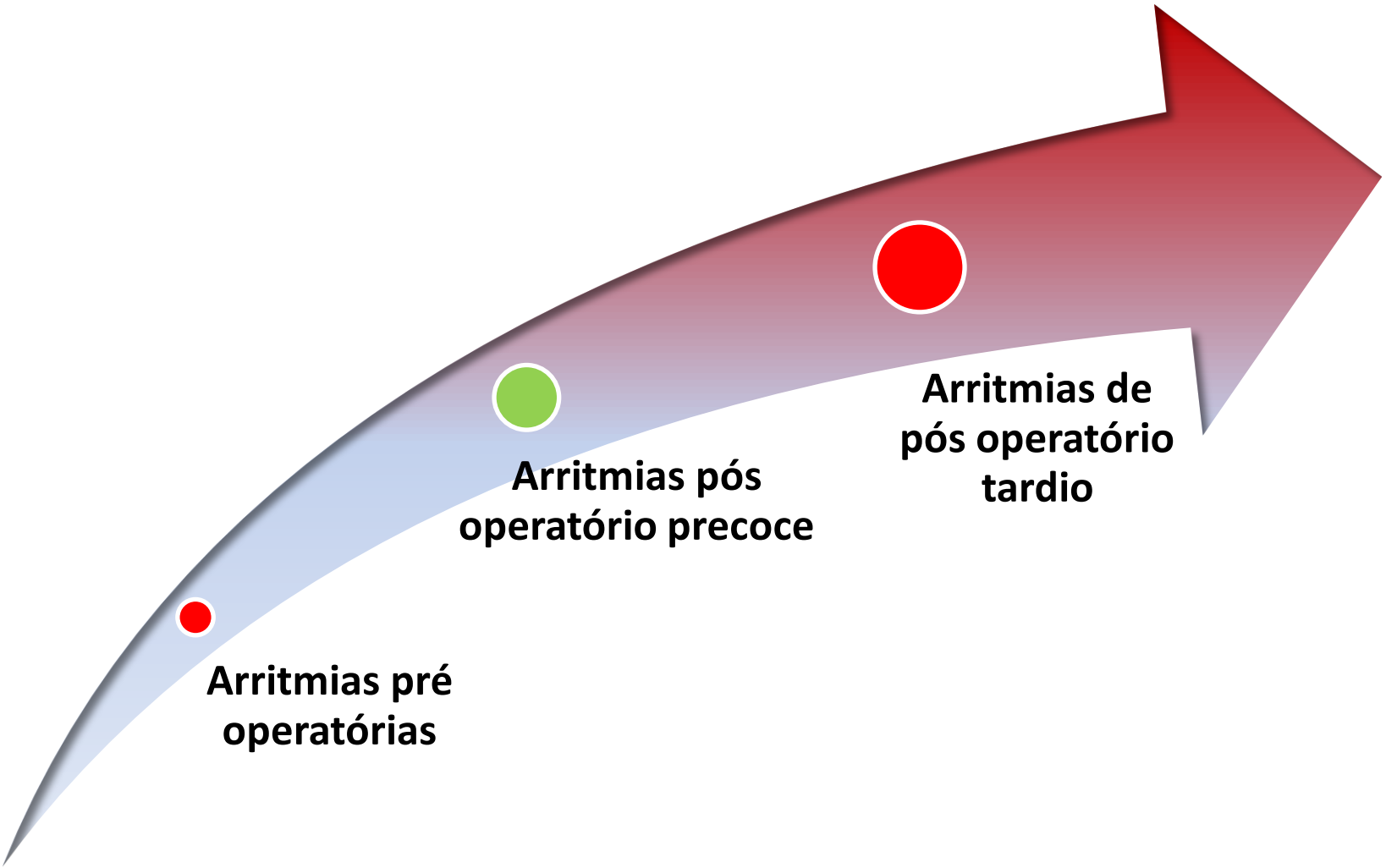
Tabela 84.3 – Correlação entre tipo de cardiopatia congênita e possíveis arritmias

Condição clínica	Substrato	Arritmias pré ou pós-operatórias	Comentários
Comunicação interatrial	Dilatação do átrio direito (pré-operatório) e atriotomia e manipulação atrial (pós-operatório)	Taquicardia atrial (pré e pós) *Flutter* atrial (pré e pós) Fibrilação atrial (pré e pós) Lesão mecânica pós-operatória do sistema elétrico do coração (pós)	Fibrilação, *flutter* atrial e taquicardia atrial geralmente surgem na evolução natural tardia
Comunicação interventricular	Lesão cirúrgica do sistema de condução ou processo inflamatório pós-CEC	Bloqueios atrioventriculares (pós) Taquicardia juncional (pós) Taquicardias ventriculares (pré e pós com disfunção miocárdica)	Episódios de taquicardia juncional no pós-operatório são bem tratados com propafenona, se não houver disfunção
Transposição corrigida de grandes artérias (L-TGA)	Distorção do sistema de condução pela inversão ventricular, lesão cirúrgica	Bloqueios atrioventriculares até BAVT	Pode ocorrer espontaneamente ou no pós-operatório de ventriculosseptoplastia, por exemplo
Isomerismo atrial	Esquerdo: ausência de nódulo sinusal; direito: dois nódulos sinusais; presença de dois nódulos atrioventriculares	Arritmias atriais (ritmos atriais ectópicos, taquicardia atrial multifocal) Taquicardia por reentrada atrioventricular por feixe acessório ou pelos dois NAV	Pode ter diversas arritmias atriais primárias ou secundárias a procedimentos cirúrgicos
Tetralogia de Fallot	Disfunção do VD ou lesão pos-operatória	Arritmias ventriculares (simples ou complexas) Maior risco quanto mais tardio o pós-operatório e maior a idade da correção cirúrgica	Risco de morte súbita e arritmias malignas quando QRS > 180 ms, insuficiência pulmonar importante e disfunção de VD
Anomalia de Ebstein	Dilatação atrial e feixes anômalos	Arritmias atriais (*flutter* e FA) WPW	Maior incidência de feixe anômalo que a população geral
Miocardiopatia hipertrófica	Feixes acessórios e reentradas na musculatura ventricular	TPSV por macrorreentrada atrioventricular	Septo maior que 30 mm, síncope, TVNS, TVS e história familiar

Identificação dos eventos arrítmicos



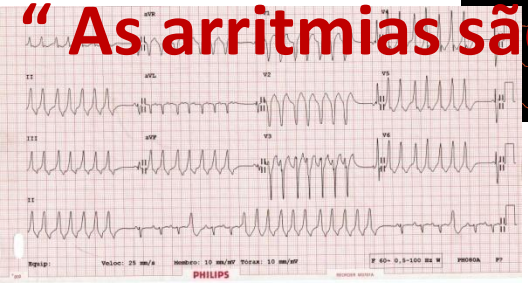
Identificação dos eventos arrítmicos



Cirurgias

- Manipulação atrial ou valvar tricuspide ou mitral
  - Arritmias atriais
  - Disfunção sinusal
- Manipulação ventricular ou ampliação valvar aórtica ou pulmonar
  - Taquicardias juncionais
  - Taquicardias ventriculares
  - Bloqueios AV
- Isomerismos
  - Disfunção sinusal
  - Ritmo atrial ectópico
  - Taqui reentrada

- CEC
- Disturbios metabólicos
- Stress catecolaminérgico
- DVA



“ As arritmias são os gritos de um coração doente “

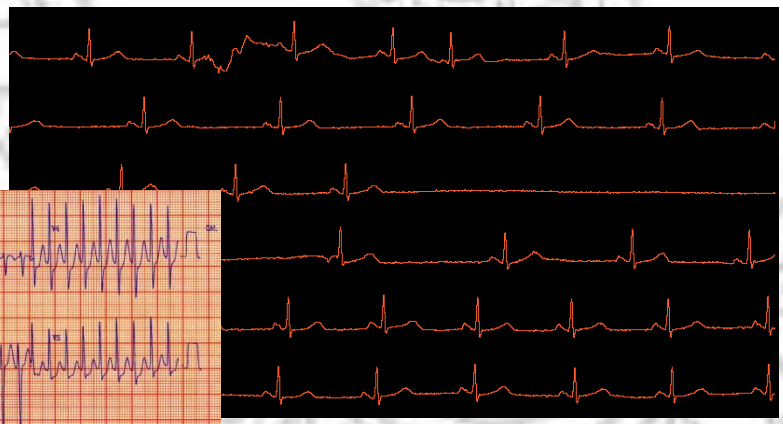
Arritmias

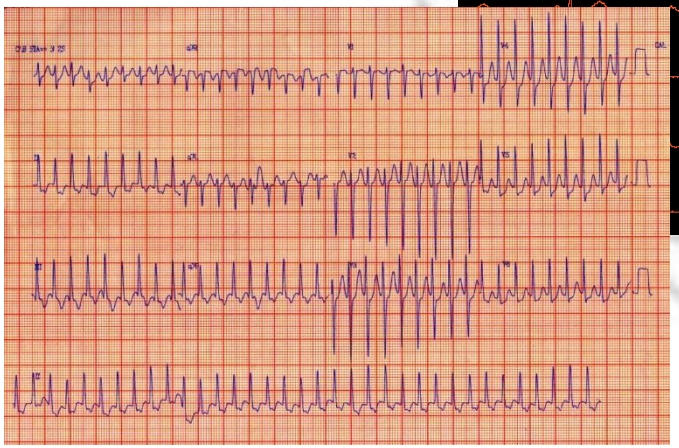
Taquicardias

- TSV
- Ventriculares

Bradicardias

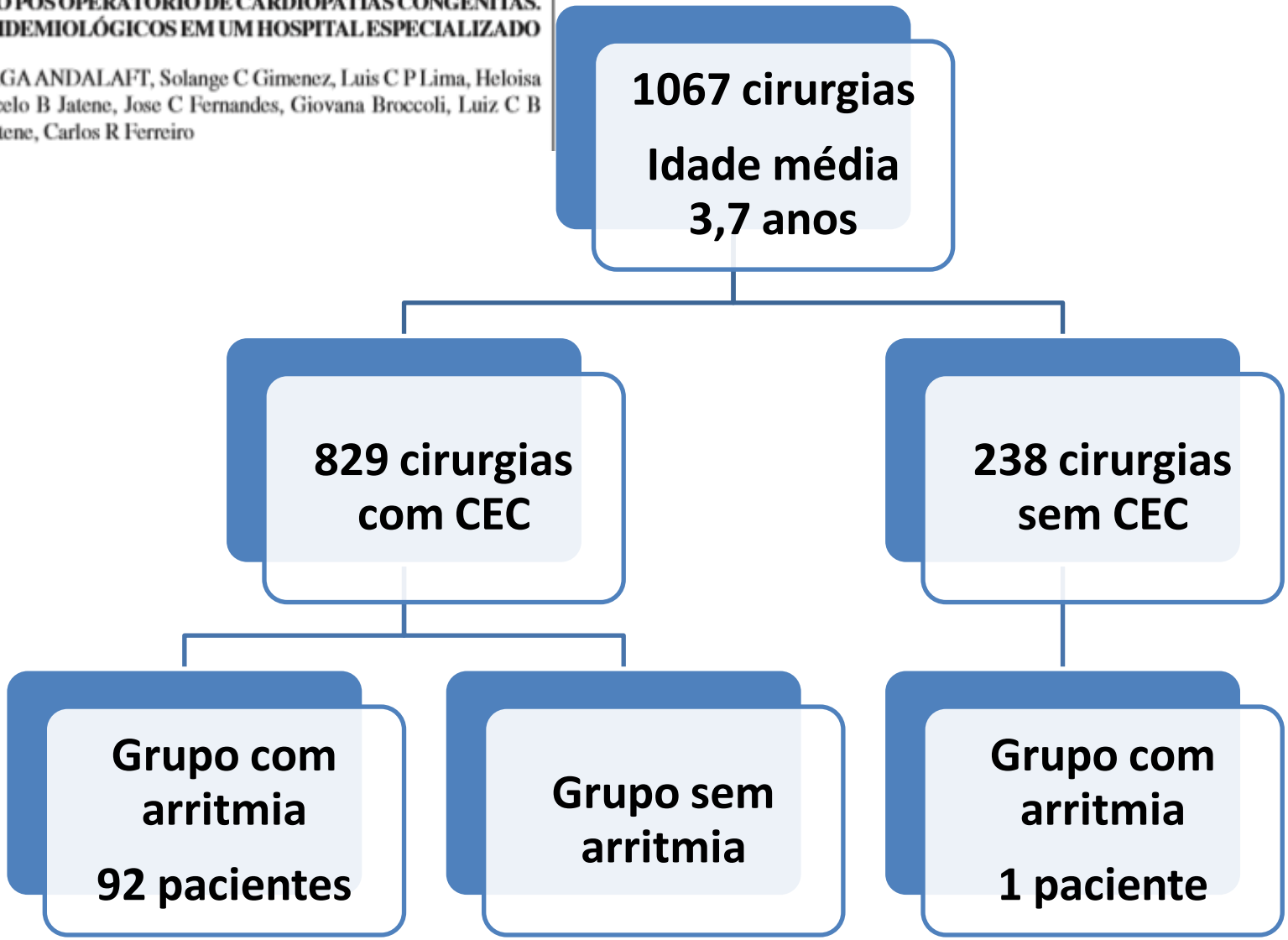
- Automatismo
- Bloqueios sinoatriais
- Bloqueios AV





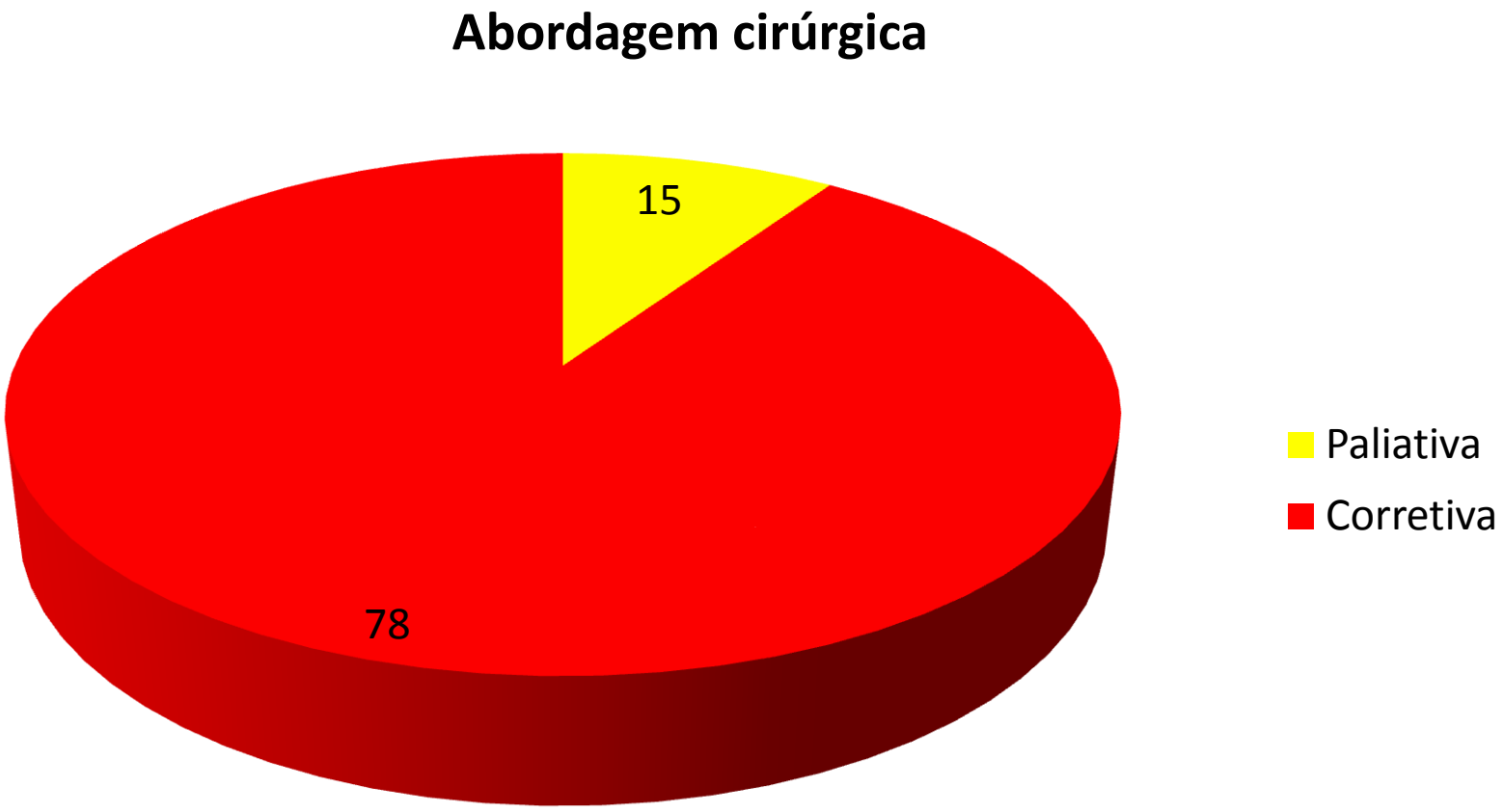
ARRITMIAS NO PÓS OPERATÓRIO DE CARDIOPATIAS CONGÊNITAS. ASPECTOS EPIDEMIOLÓGICOS EM UM HOSPITAL ESPECIALIZADO

ROGÉRIO BRAGA ANDALAFT, Solange C Gimenez, Luis C P Lima, Heloisa M Khader, Marcelo B Jatene, Jose C Fernandes, Giovana Broccoli, Luiz C B Souza, Ieda B Jatene, Carlos R Ferreiro



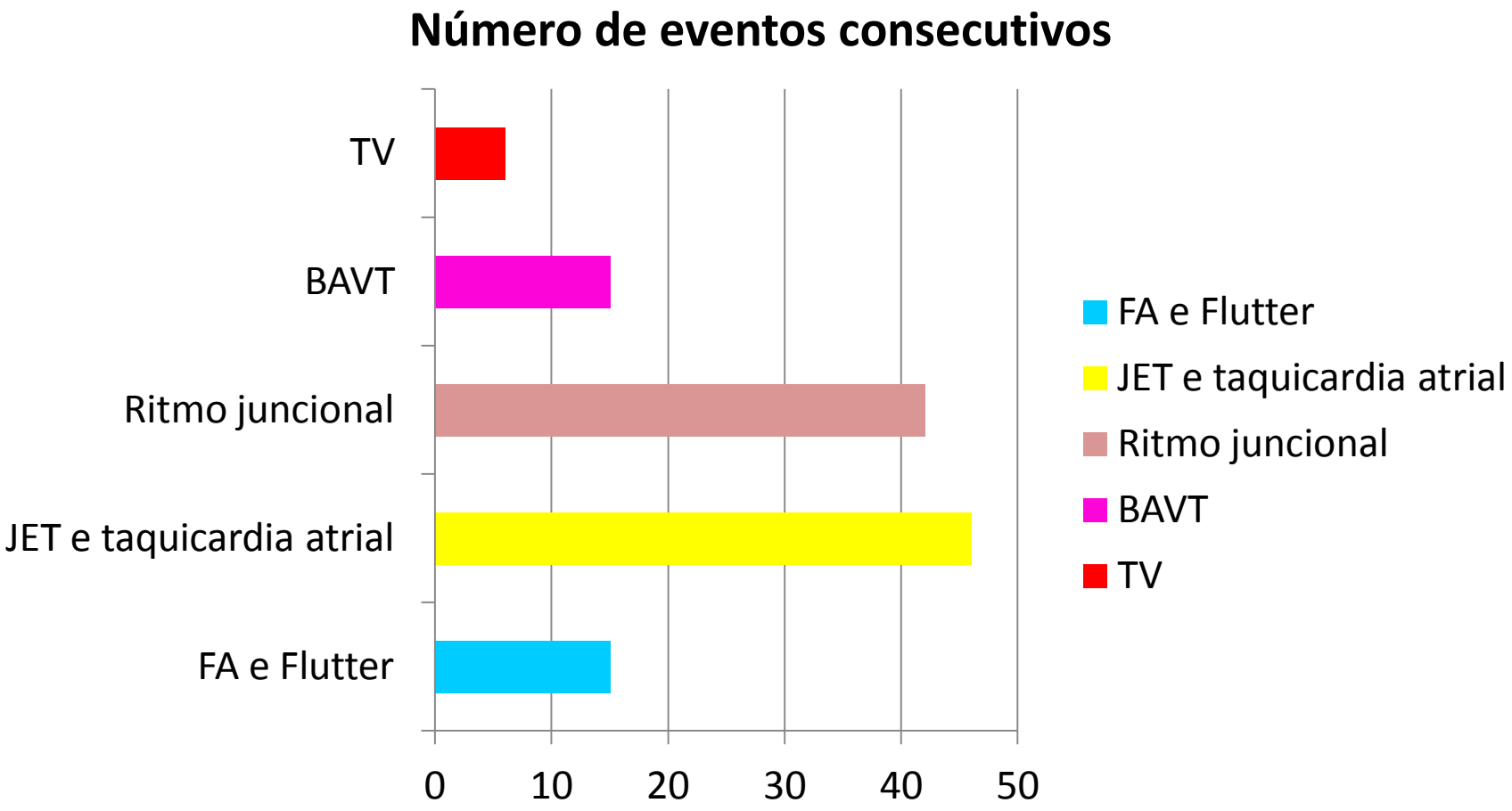
Andalaft, R; Gimenez S C Relampa 2010

Abordagem cirúrgica nos pacientes portadores de arritmia (n=93)

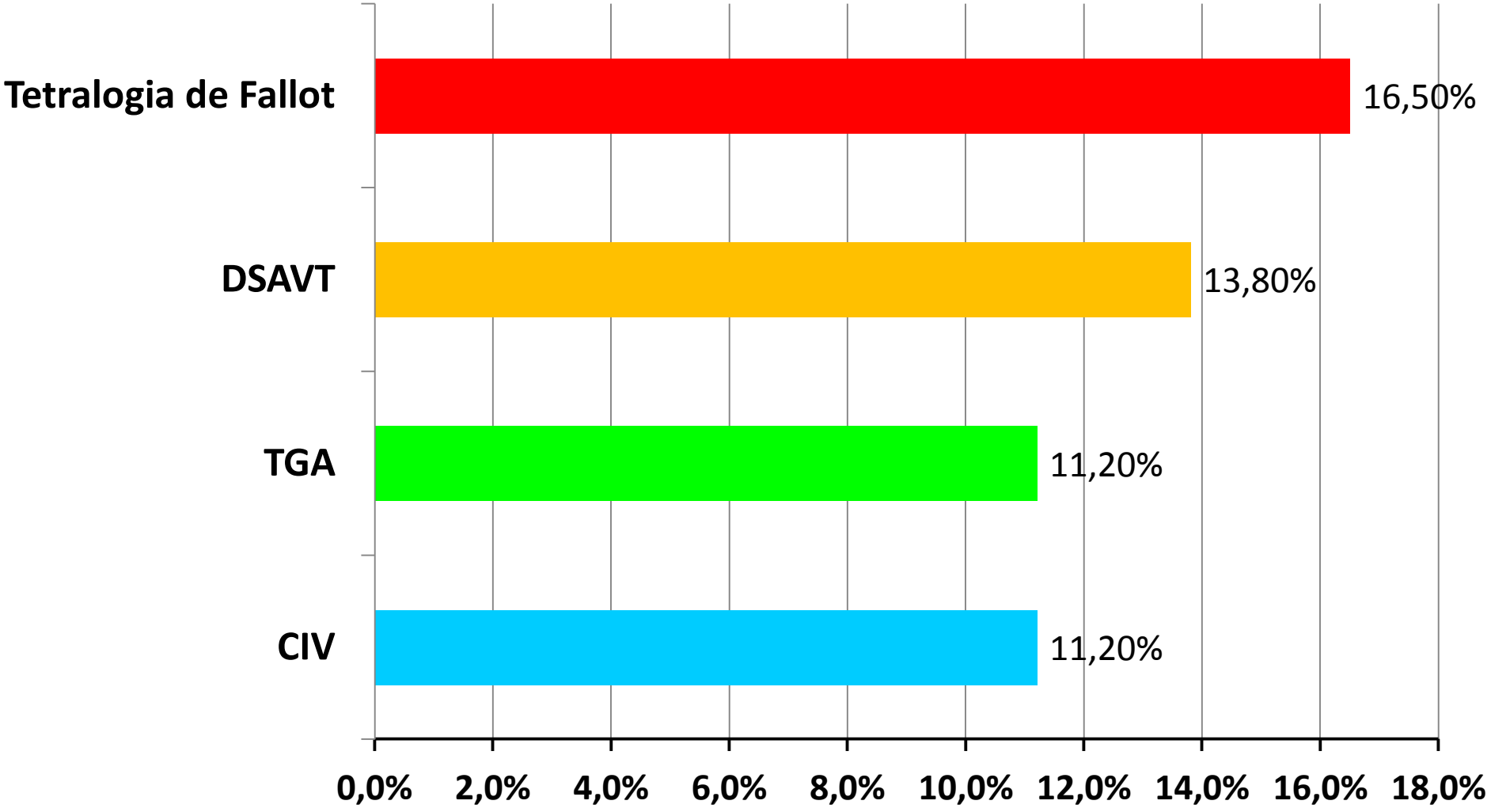


Andalaft, R; Gimenez S C Relampa 2010

Eventos arritmicos consecutivos (124) em 93 pacientes portadores de arritmias

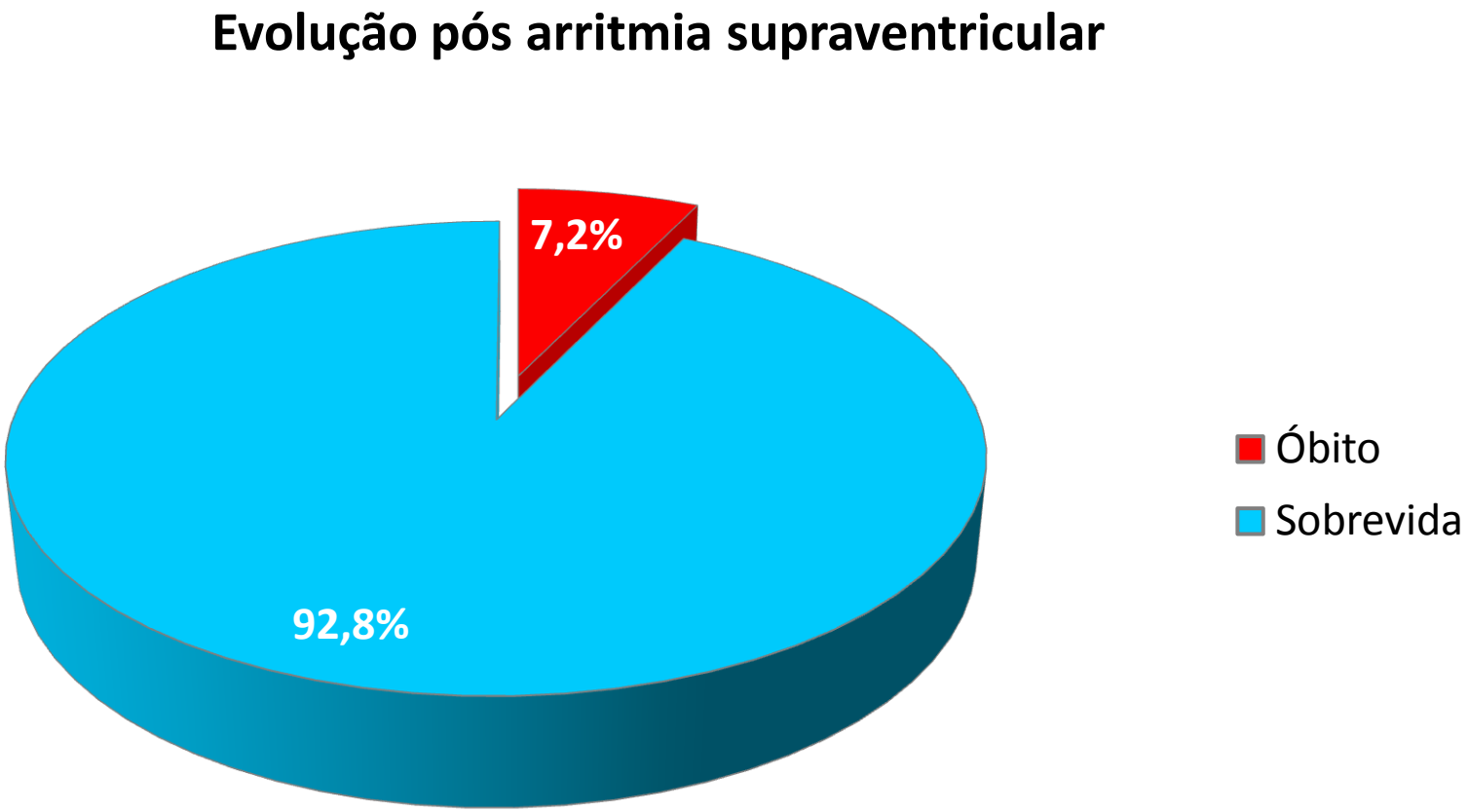


Cardiopatias mais propensas à arritmia



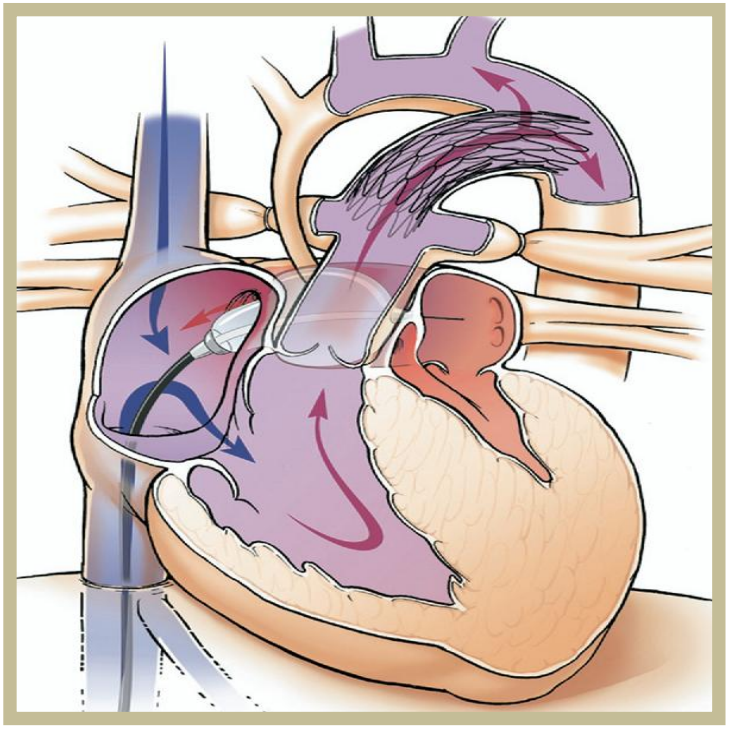
Andalaft, R; Gimenez S C Relampa 2010

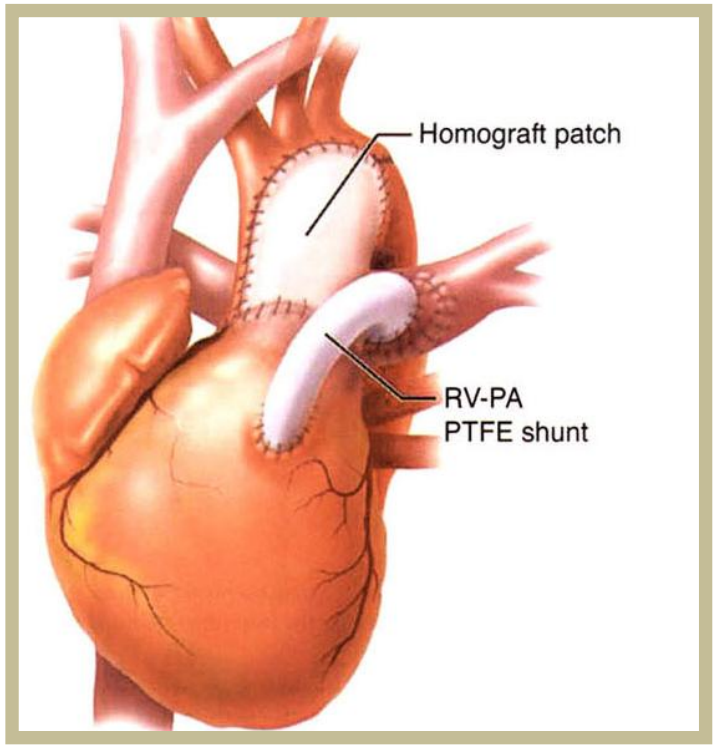
Índice de mortalidade após TSV



ARRITMIAS NO PÓS OPERTÓRIO DE PACIENTES COM SÍNDROME DE HIPOPLASIA DO CORAÇÃO ESQUERDO (SHCE). ASPECTOS CLÍNICOS E EVOLUTIVOS

ROGÉRIO BRAGA ANDALAFT, Bianca L Bezerra, Danielle G Leite, Solange C Gimenez, Jose Carlos Fernandes, Simone R F F Pedra, Carlos A C Pedra, Marcelo B Jatene, Ieda B Jatene, Carlos R Ferreiro





Andalaft et al Arq Bras Cardiol 2011 97(3 supl.1):1-166

ARRITMIAS NO PÓS OPERTÓRIO DE PACIENTES COM SÍNDROME DE HIPOPLASIA DO CORAÇÃO ESQUERDO (SHCE). ASPECTOS CLÍNICOS E EVOLUTIVOS

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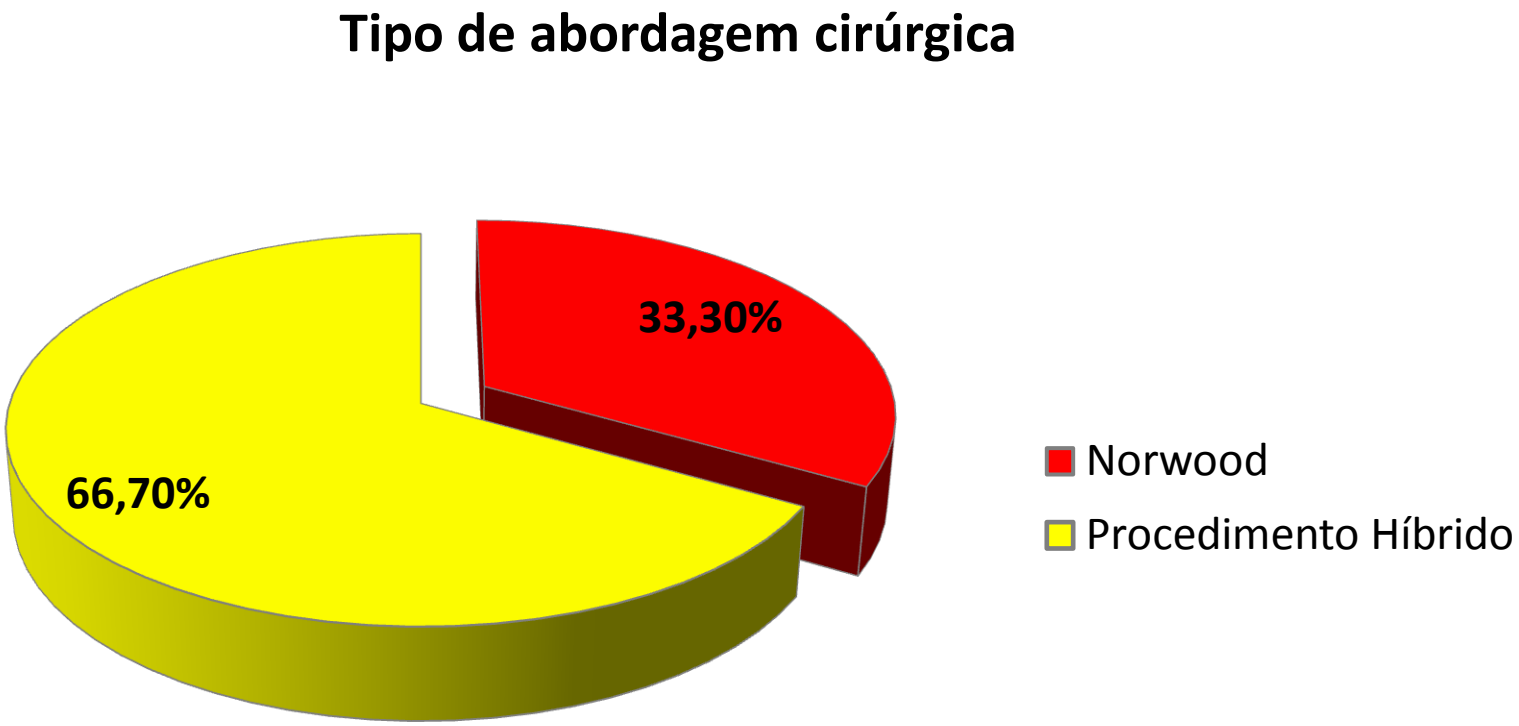
- 21 pacientes com fisiologia de SHCE
- Idade média do procedimento 6 dias
- Primeiro estágio de cirurgia paliativa
- Abordagem cirúrgica entre os anos de 2001 e 2010
- 14% apresentavam DSAV total associado

Andalaft et al Arq Bras Cardiol 2011 97(3 supl.1):46

Estratégia de abodagem cirúrgica

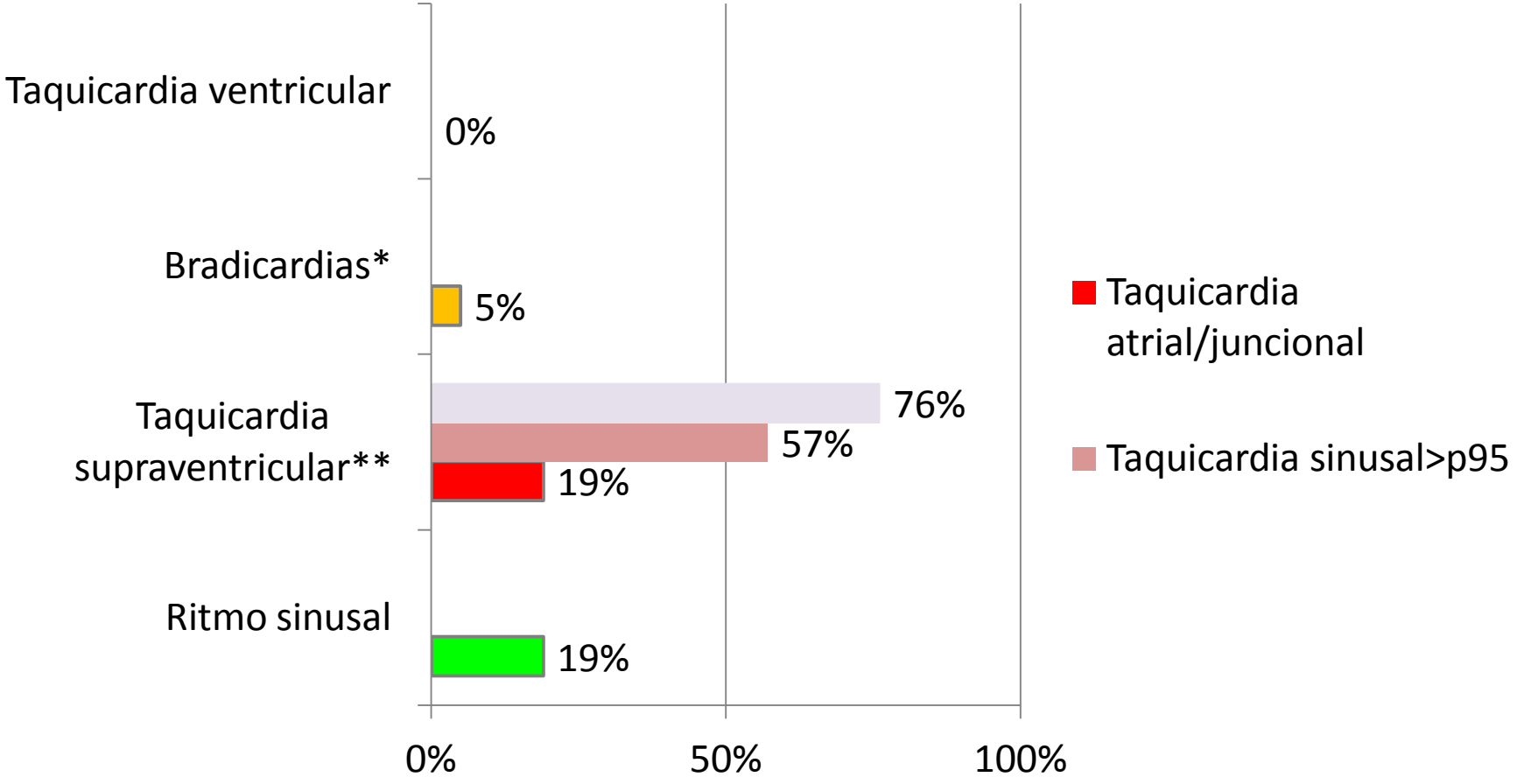


Andalaft et al Arq Bras Cardiol 2011 97(3 supl.1):1-166

Incidência de arritmias no pós operatório

Andalaft et al Arq Bras Cardiol 2011 97(3 supl.1):1-166

Ritmos encontrados no pós operatório

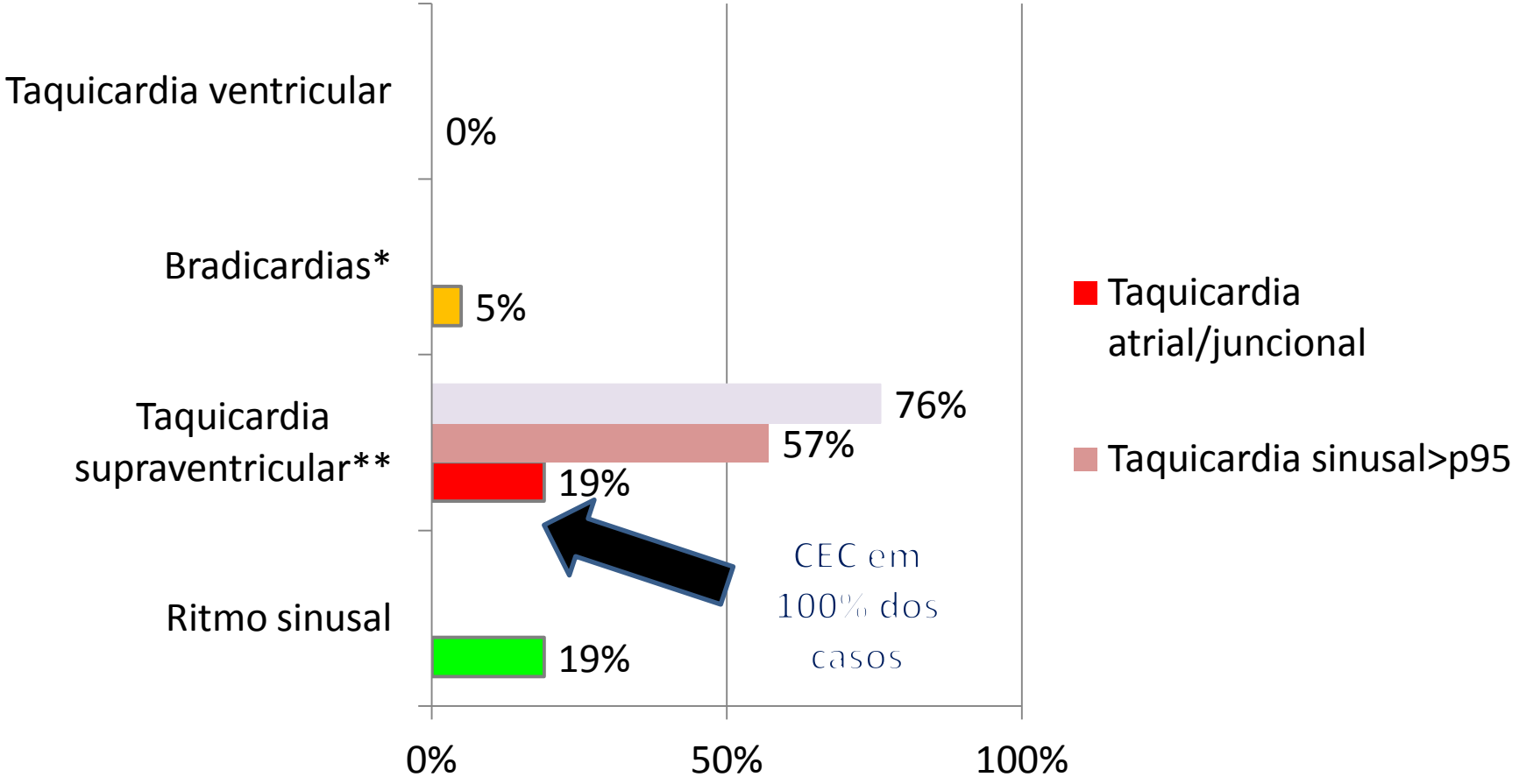


Andalaft et al Arq Bras Cardiol 2011 97(3 supl.1):1-166

* Bradicardia – 5P com bradicardia sinusal – 1 P necessitou de MP

** Incluindo taquicardia sinusal com FC maior que p95 para idade

Ritmos encontrados no pós operatório



Andalaft et al Arq Bras Cardiol 2011 97(3 supl.1):1-166

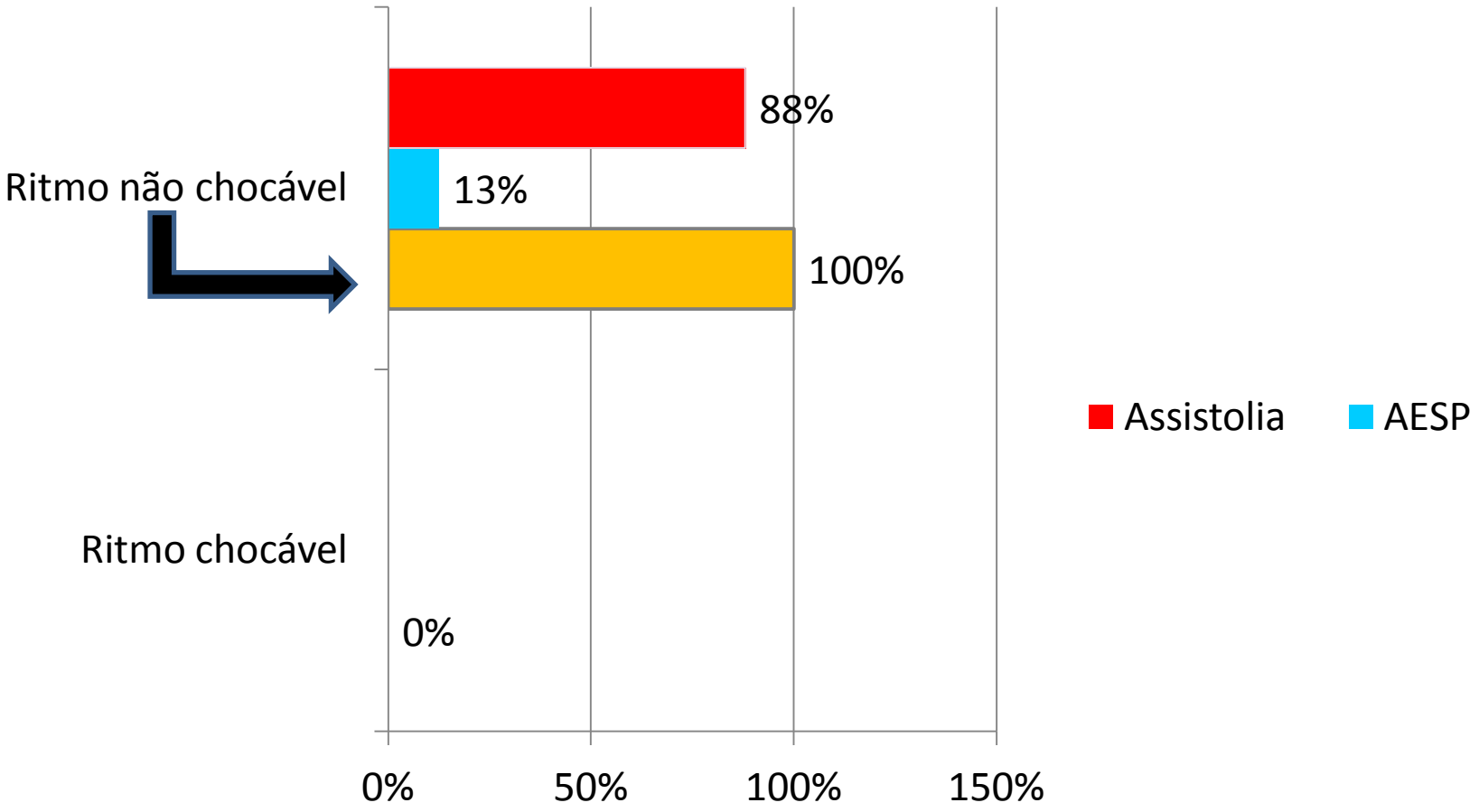
* Bradicardia – 5P com bradicardia sinusal – 1 P necessitou de MP

** Incluindo taquicardia sinusal com FC maior que p95 para idade

Incidência de PCR no pós operatório

Andalaft et al Arq Bras Cardiol 2011 97(3 supl.1):1-166

Ritmos encontrados no pós operatório



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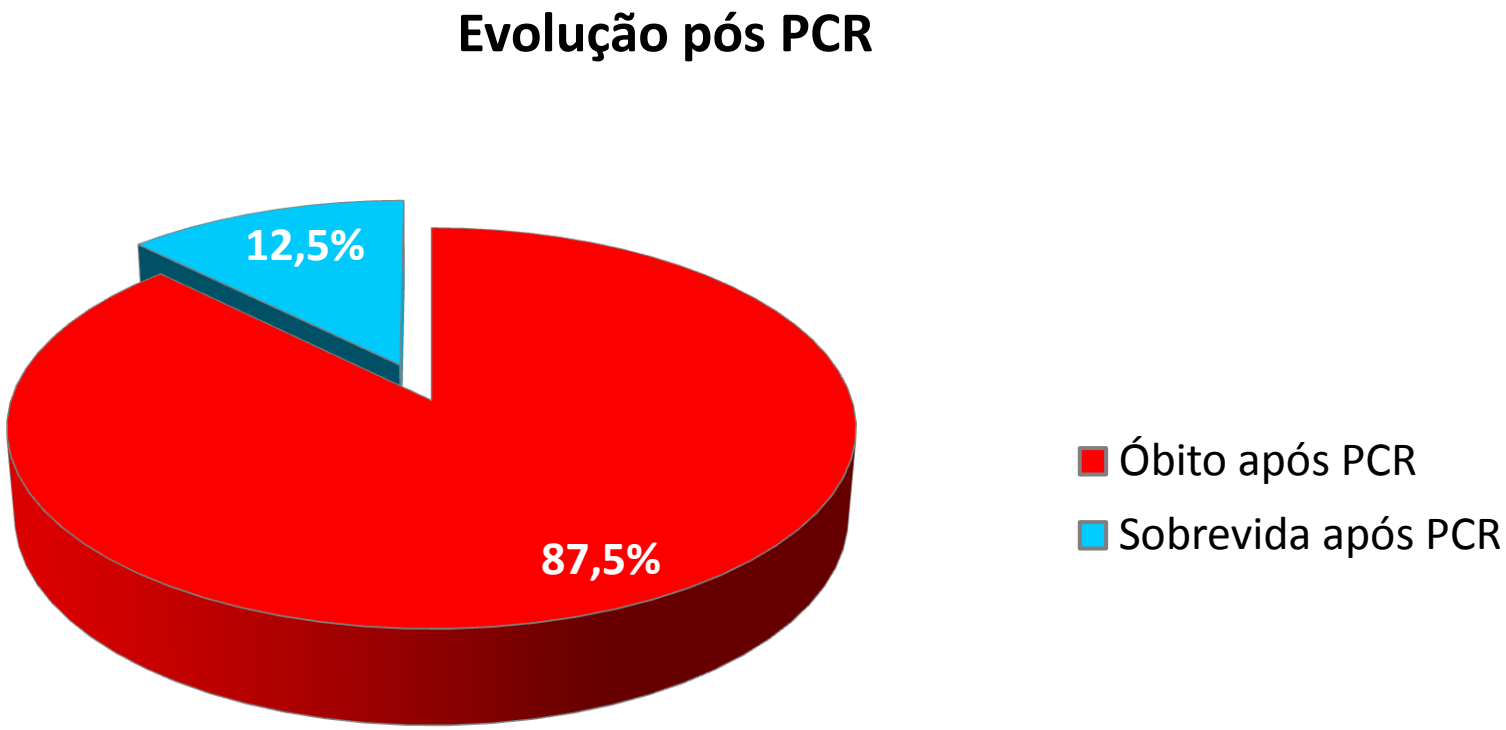
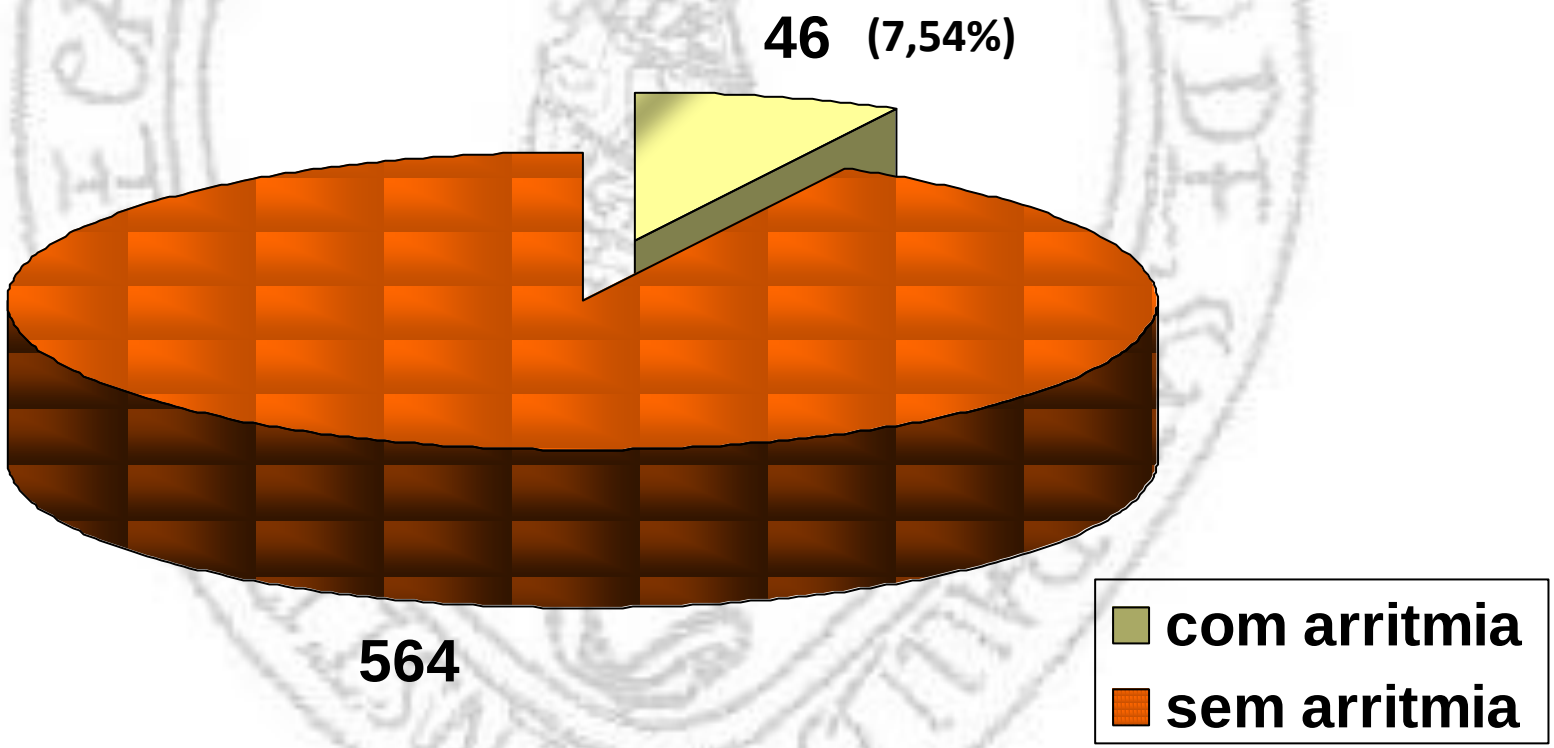
* Bradicardia – 5P com bradicardia sinusal – 1 P necessitou de MP
** Incluindo taquicardia sinusal com FC maior que p95 para idade

Índice de mortalidade após a PCR

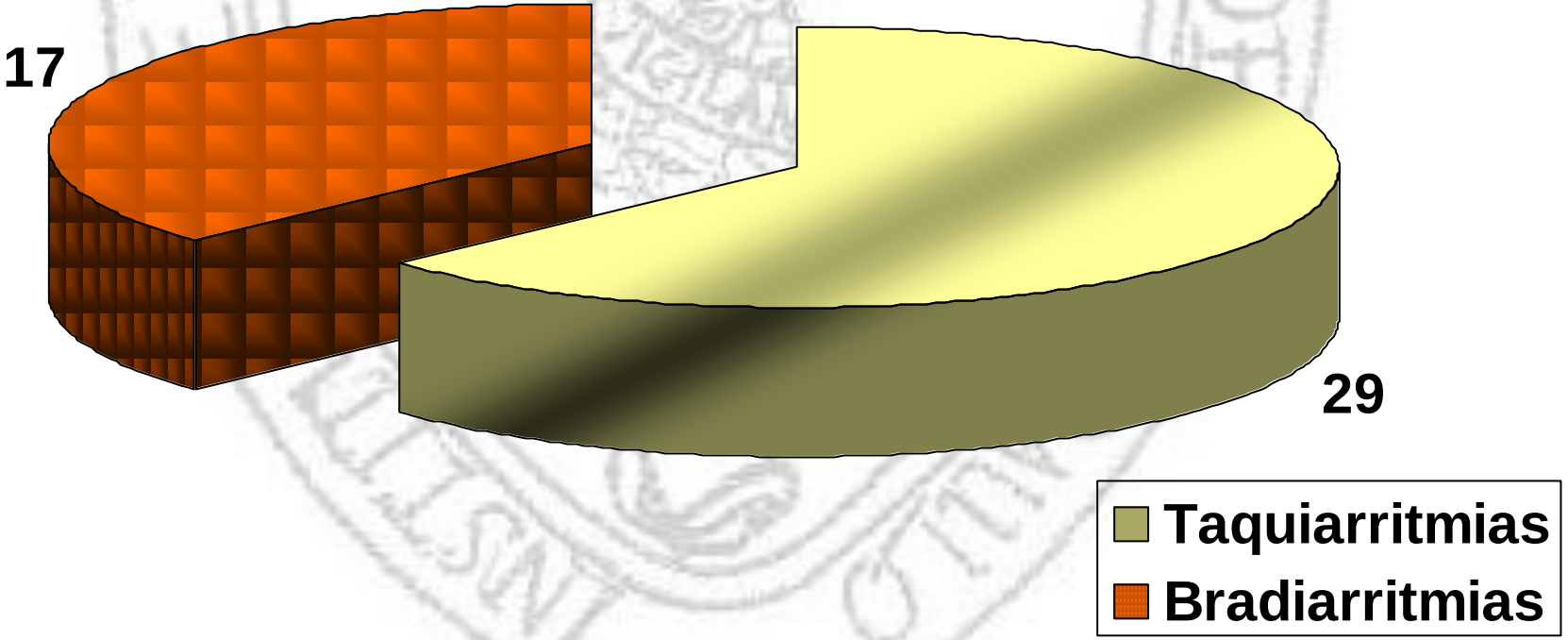


Resultados – Incidência de eventos arrítmicos



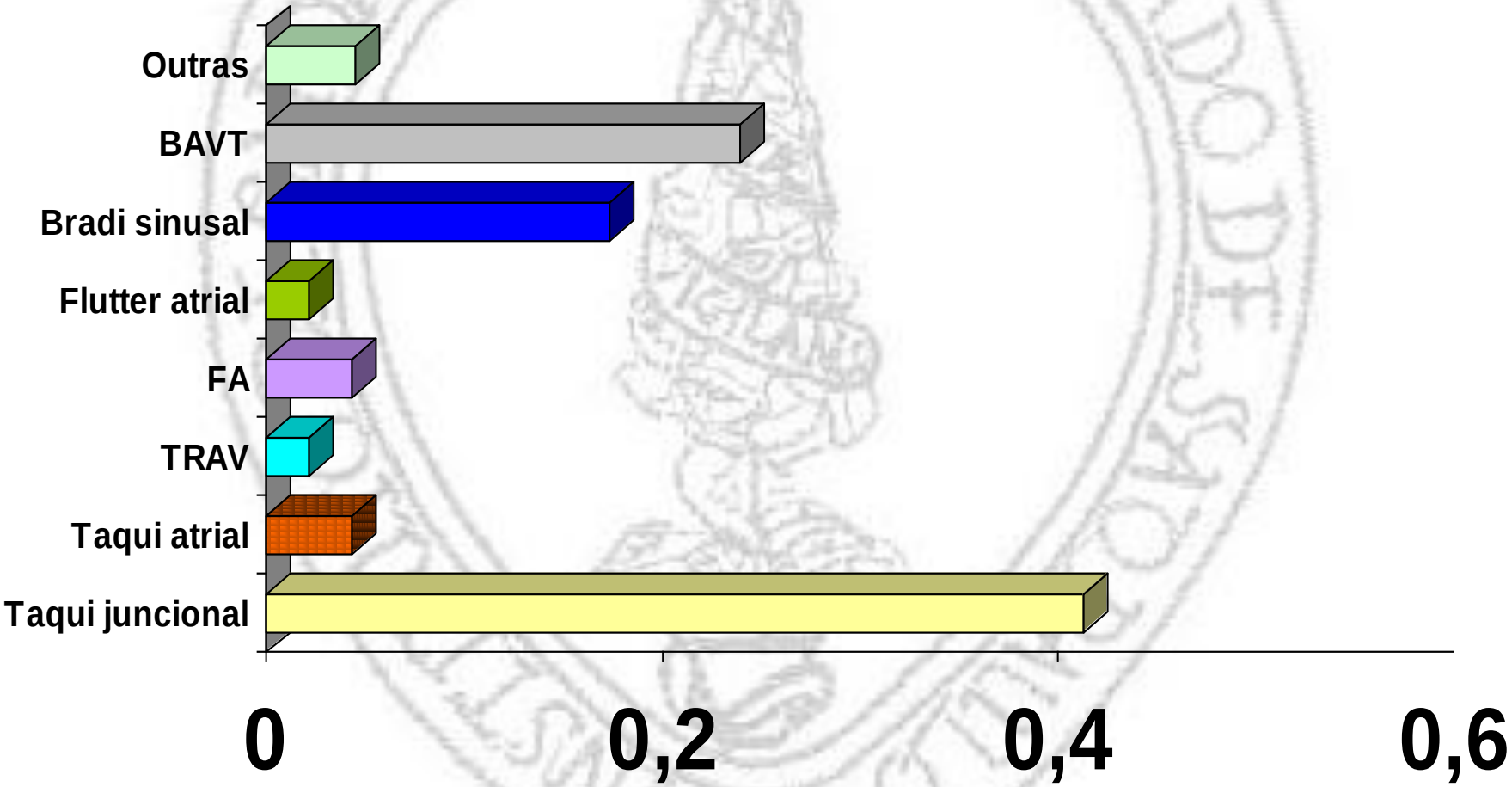
Andalaft et al - Rev. Soc Cardiol Estado de São Paulo 2007 17(2): 67

Distribuição dos eventos arrítmicos



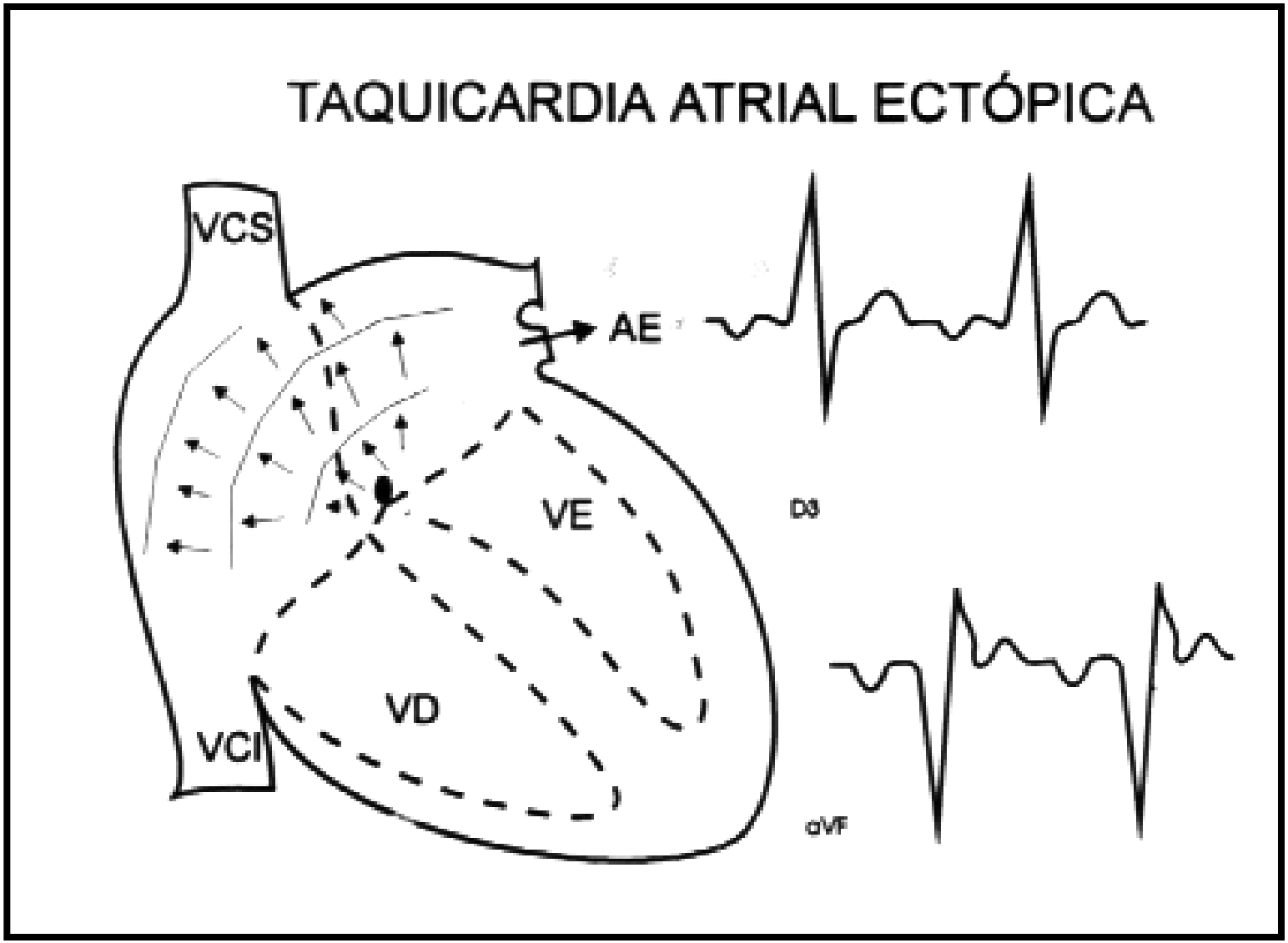
Andalaft et al - Rev. Soc Cardiol Estado de São Paulo 2007 17(2): 67

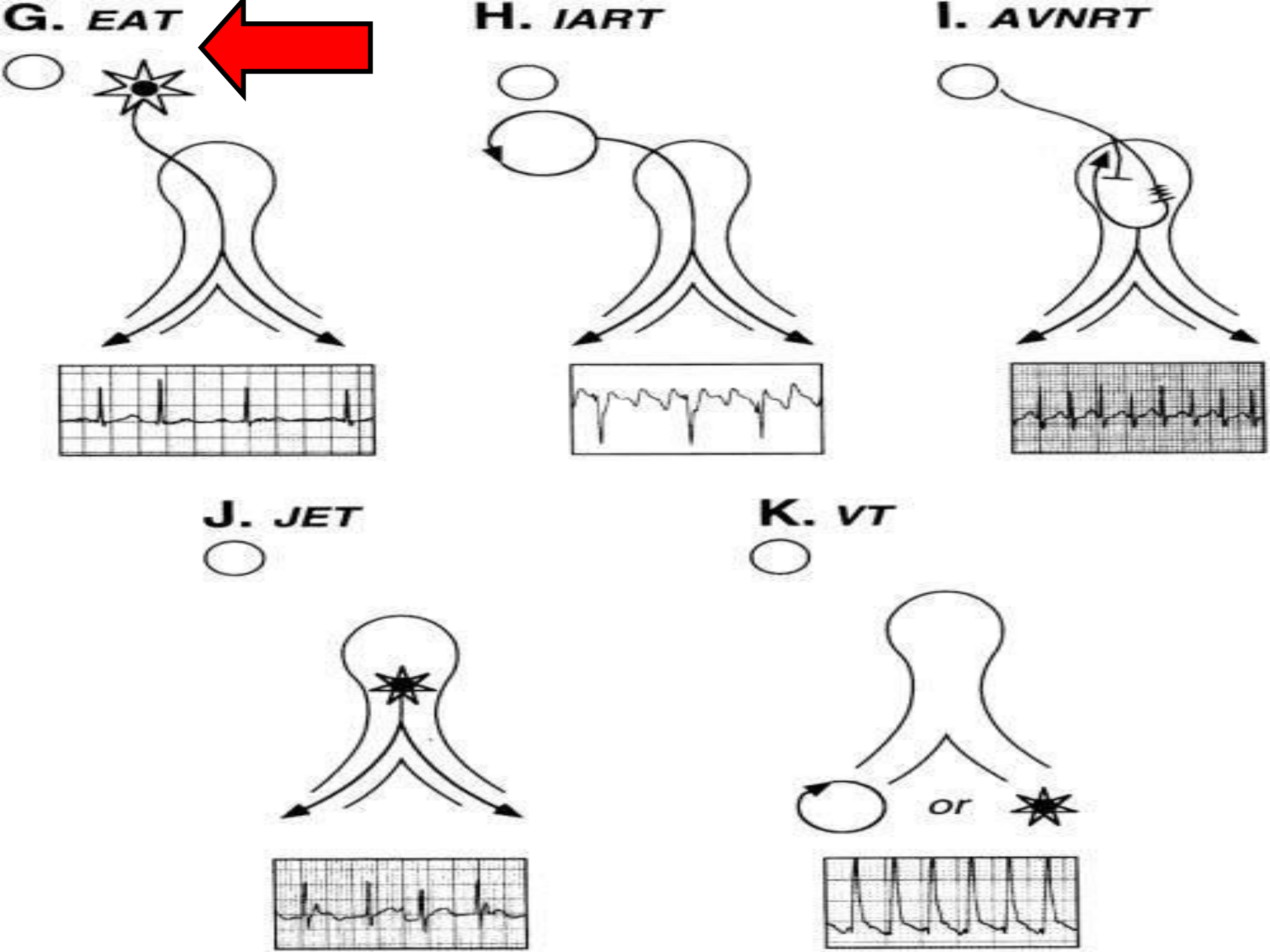
Distribuição dos eventos arrítmicos

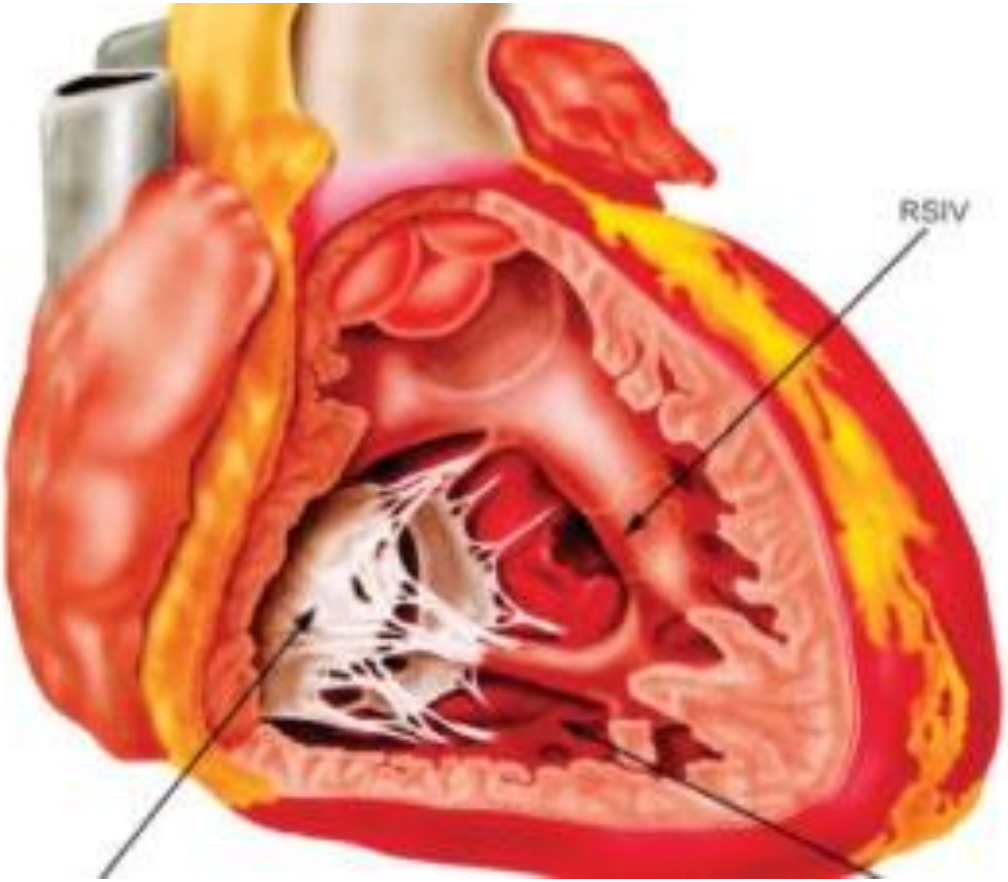


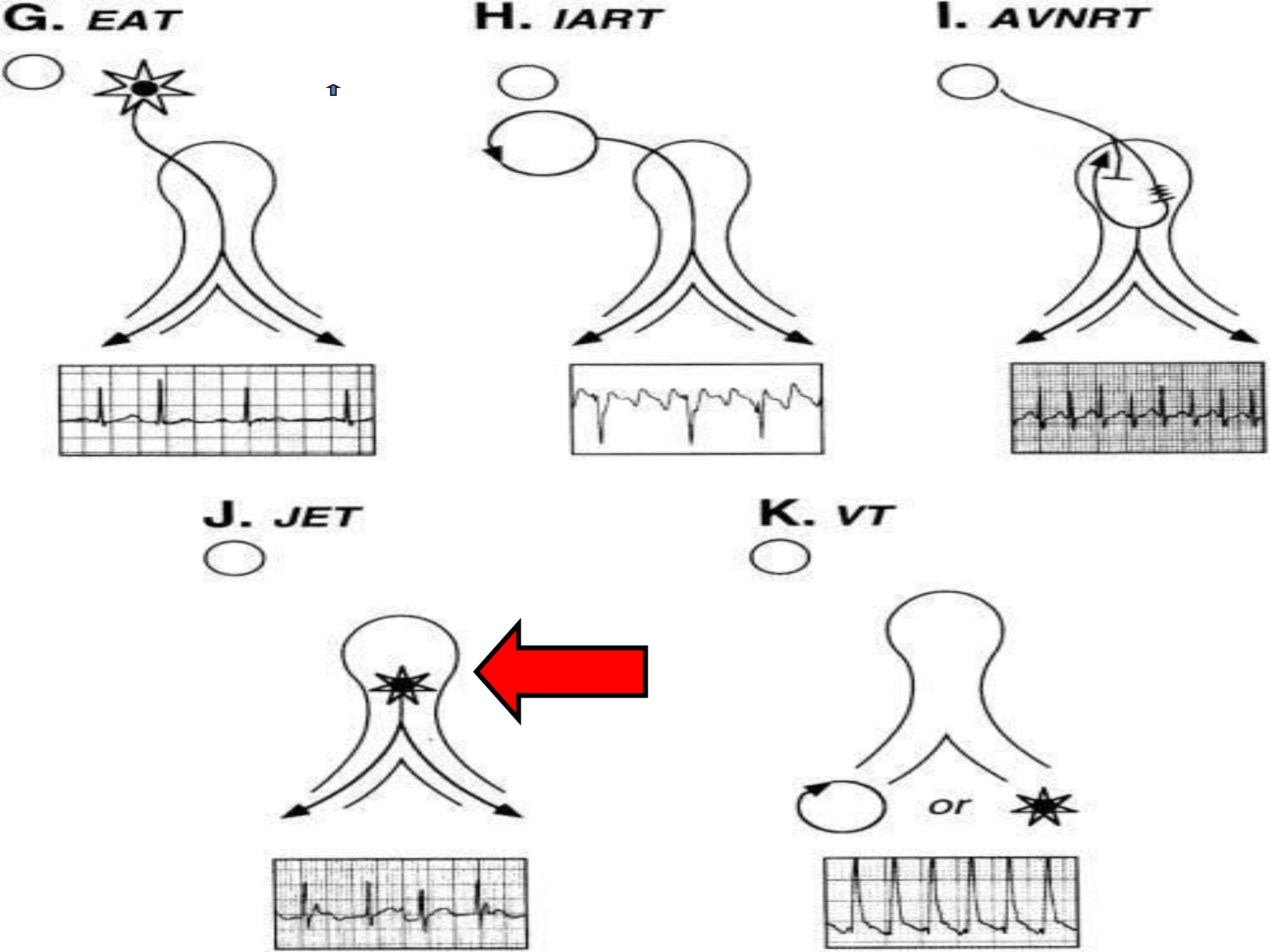
Andalaft et al - Rev. Soc Cardiol Estado de São Paulo 2007 17(2): 67

Taquicardia Atrial

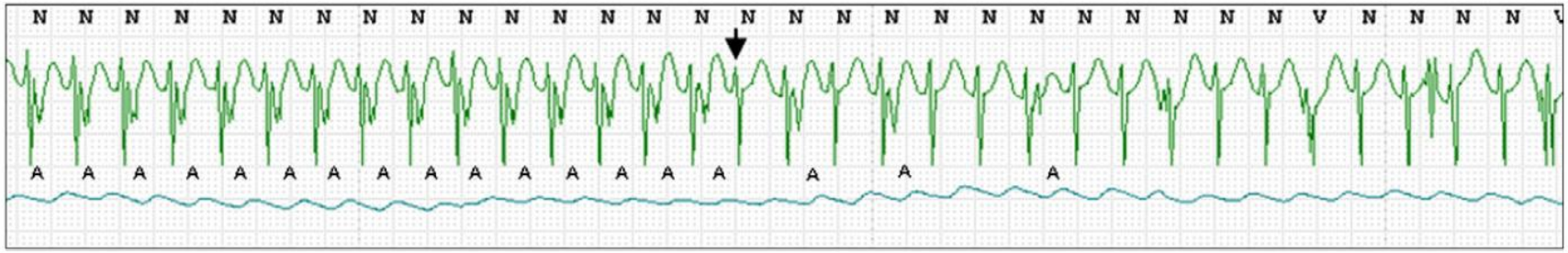



G. EAT
H. IART
I. AVNRT
J. JET
K. VT
or

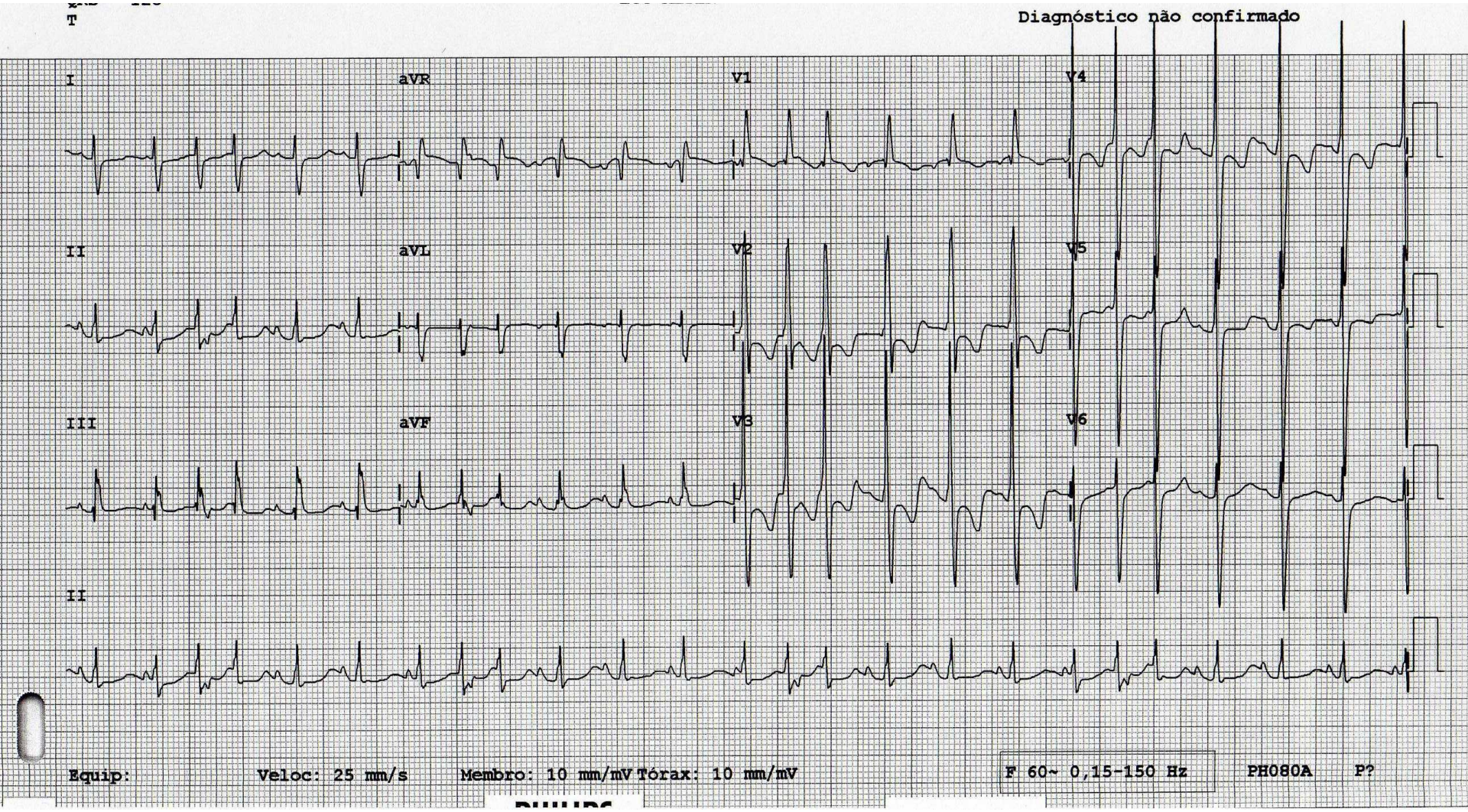

RSIV

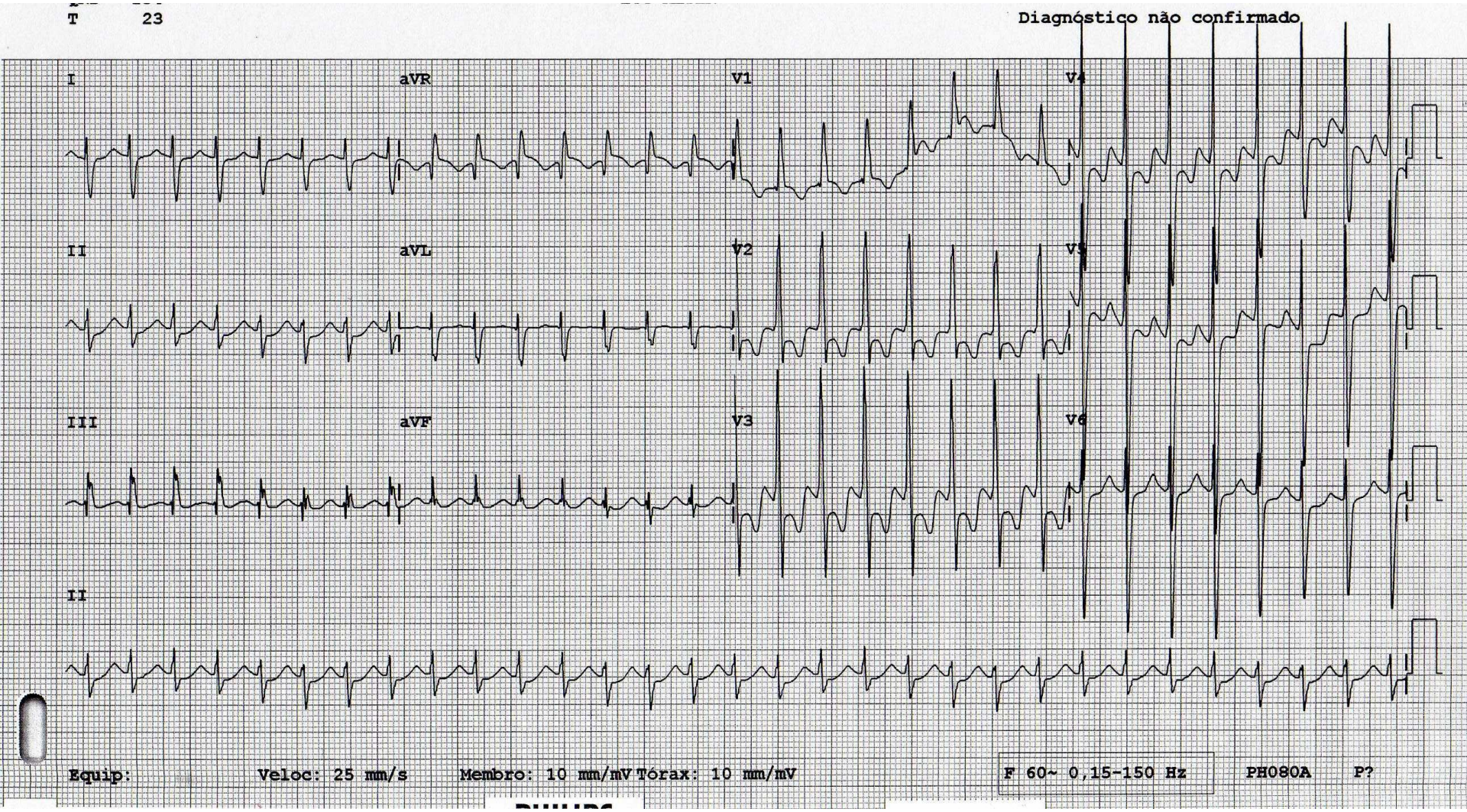

G. EAT
H. IART
I. AVNRT
J. JET
K. VT
or

Taquicardia juncional



- Onda P pode vir antes, durante ou após o QRS
- Discordância entre P e QRS
- Arritmia automática frequente no Pós operatório de cirurgias com manipulação ventricular e da junção (ex ventriculosseptoplastia)
- Por vezes necessitam de drogas que controlem o automatismo
- Por vezes diagnóstico difícil
  - Utilidade de fio atrial ou eletrodo esofágico


T
Diagnóstico não confirmado
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II
Equip:
Veloc: 25 mm/s
Membro: 10 mm/mV
Tórax: 10 mm/mV
F 60~ 0,15-150 Hz
PH080A
P?


T 23
Diagnóstico não confirmado
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II
Equip:
Veloc: 25 mm/s
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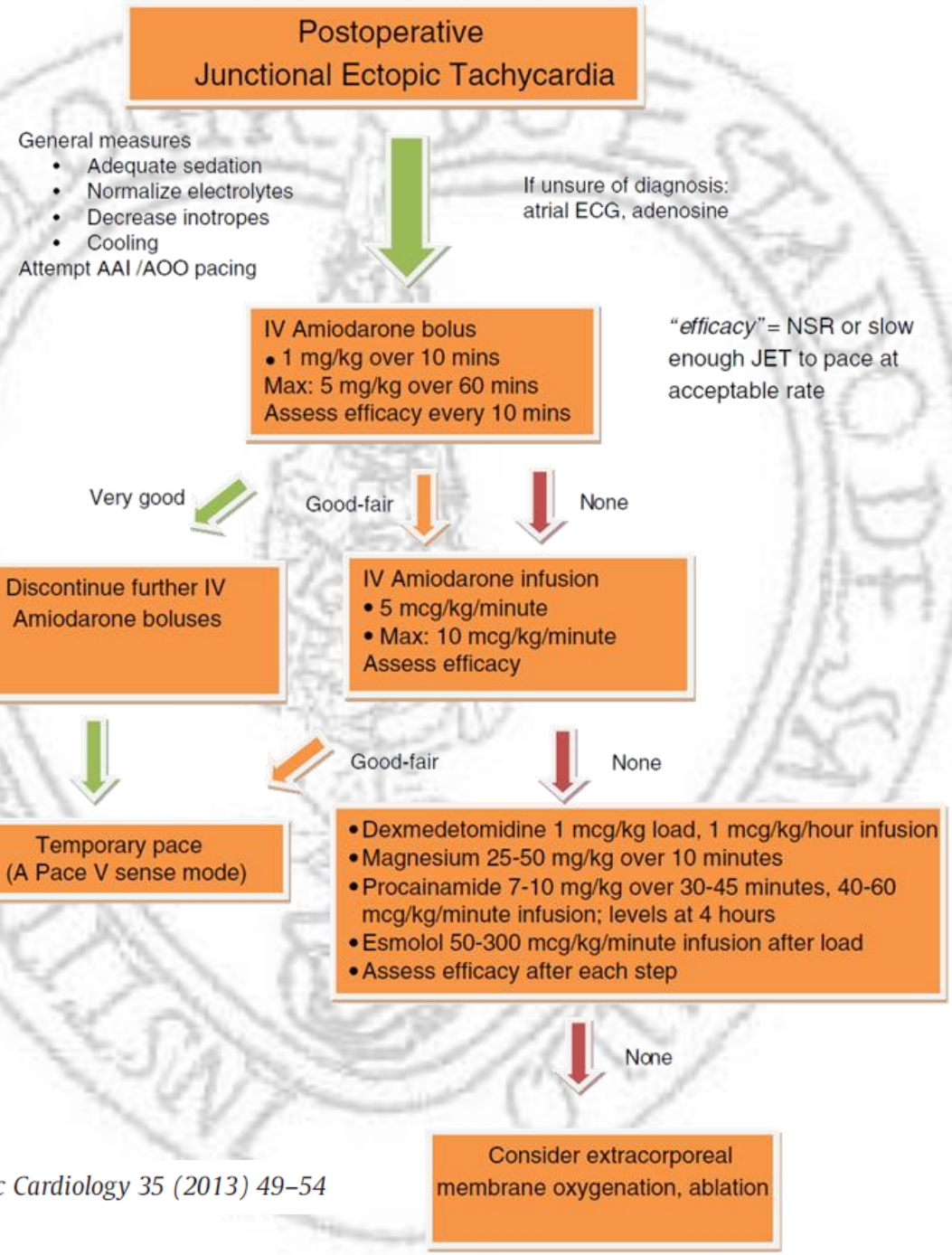
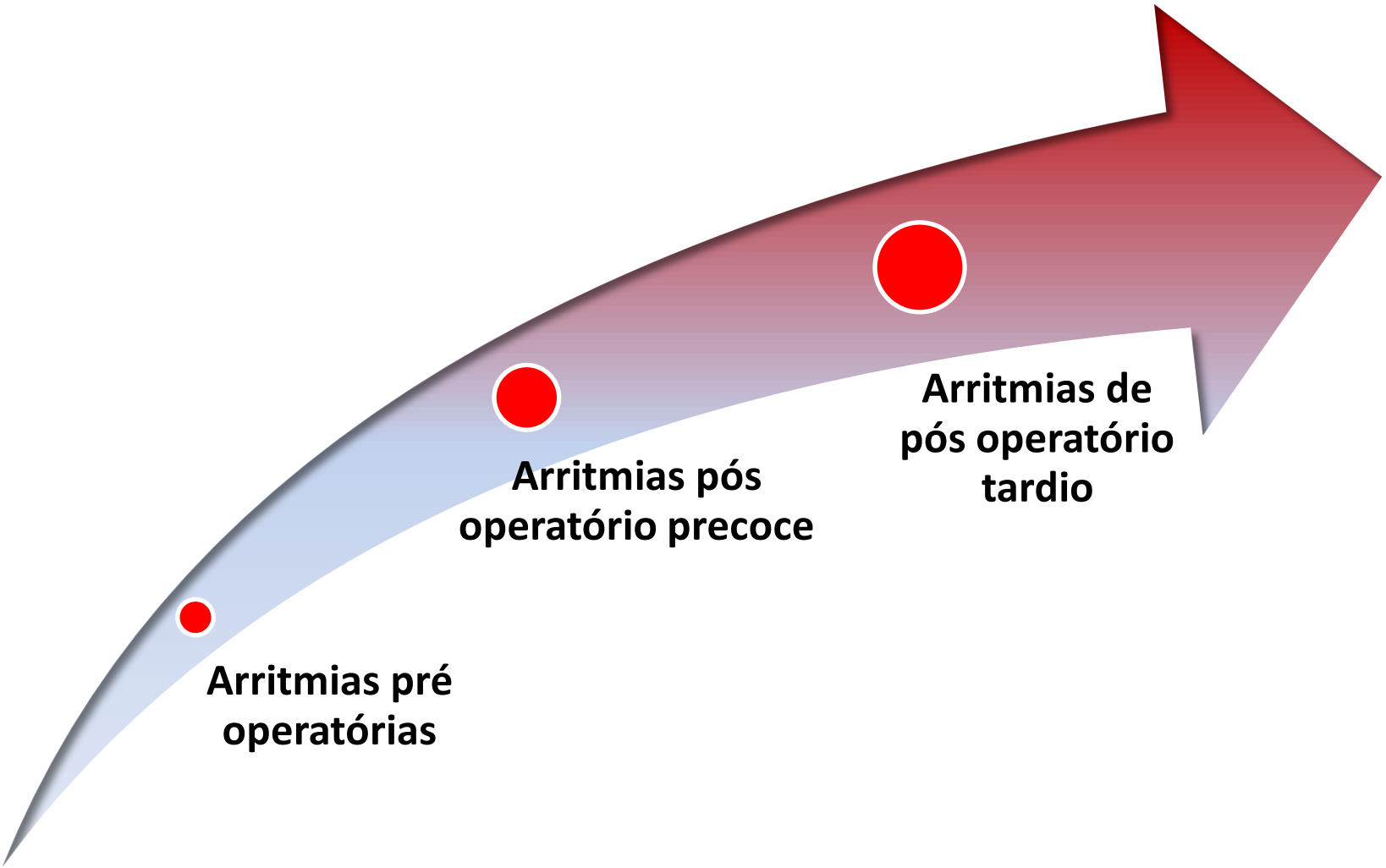
F 60~ 0,15-150 Hz
PH080A
P?



A.S. Batra, N. Mohari / Progress in Pediatric Cardiology 35 (2013) 49–54

Identificação dos eventos arrítmicos



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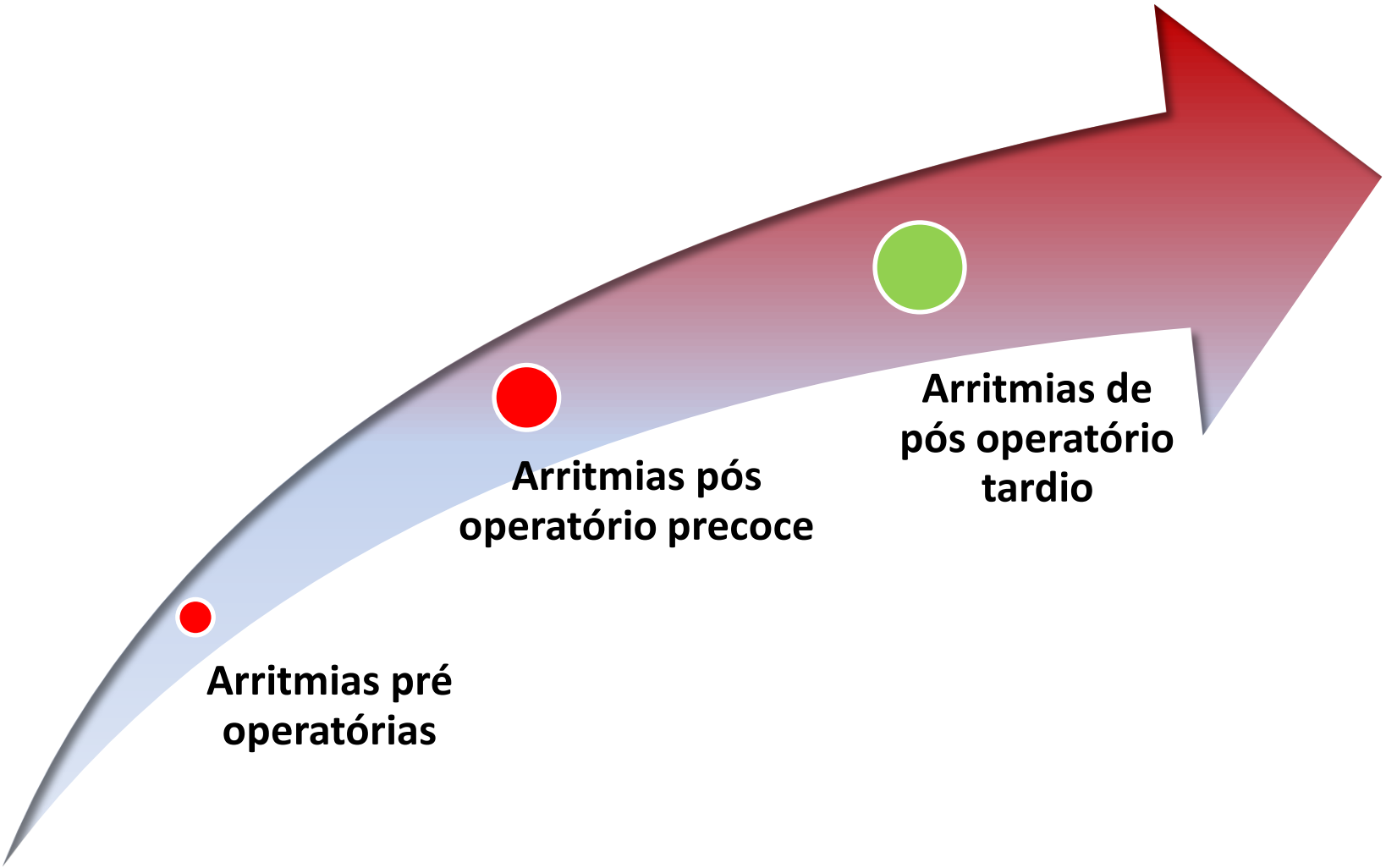

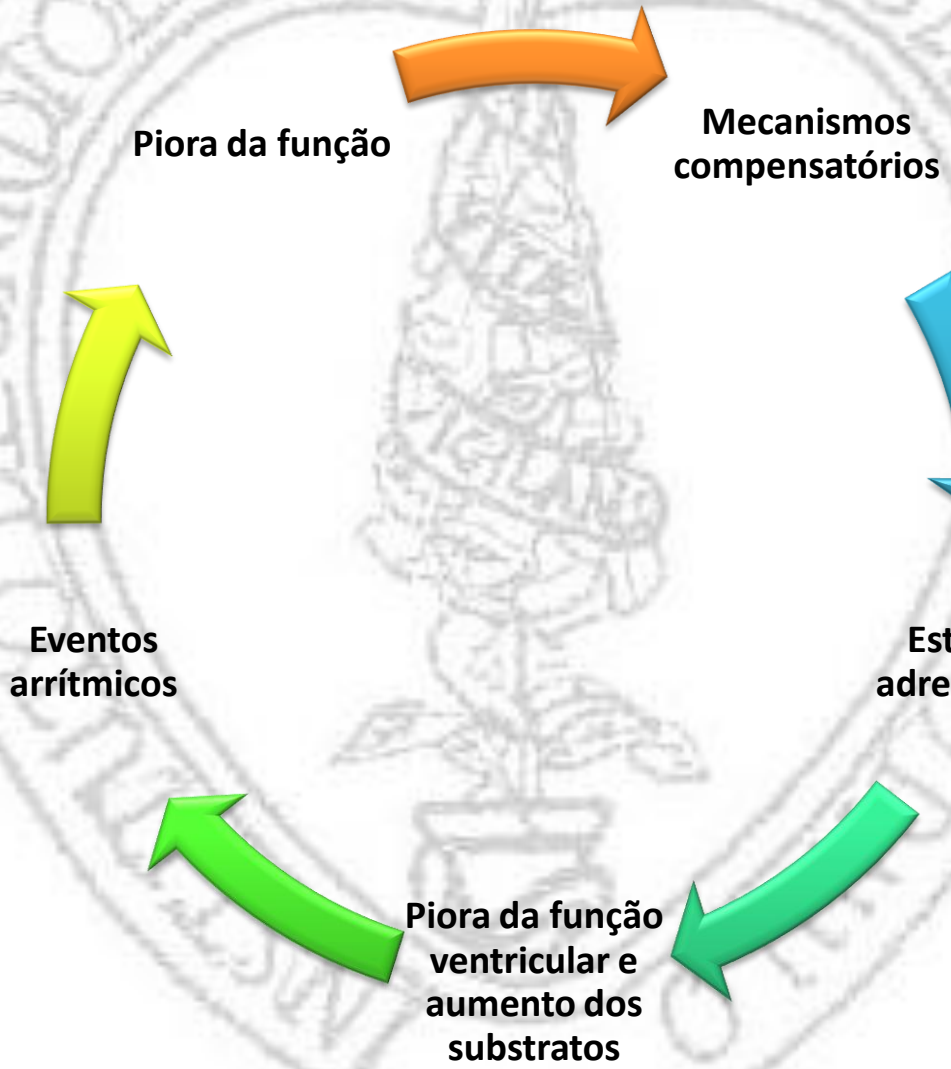
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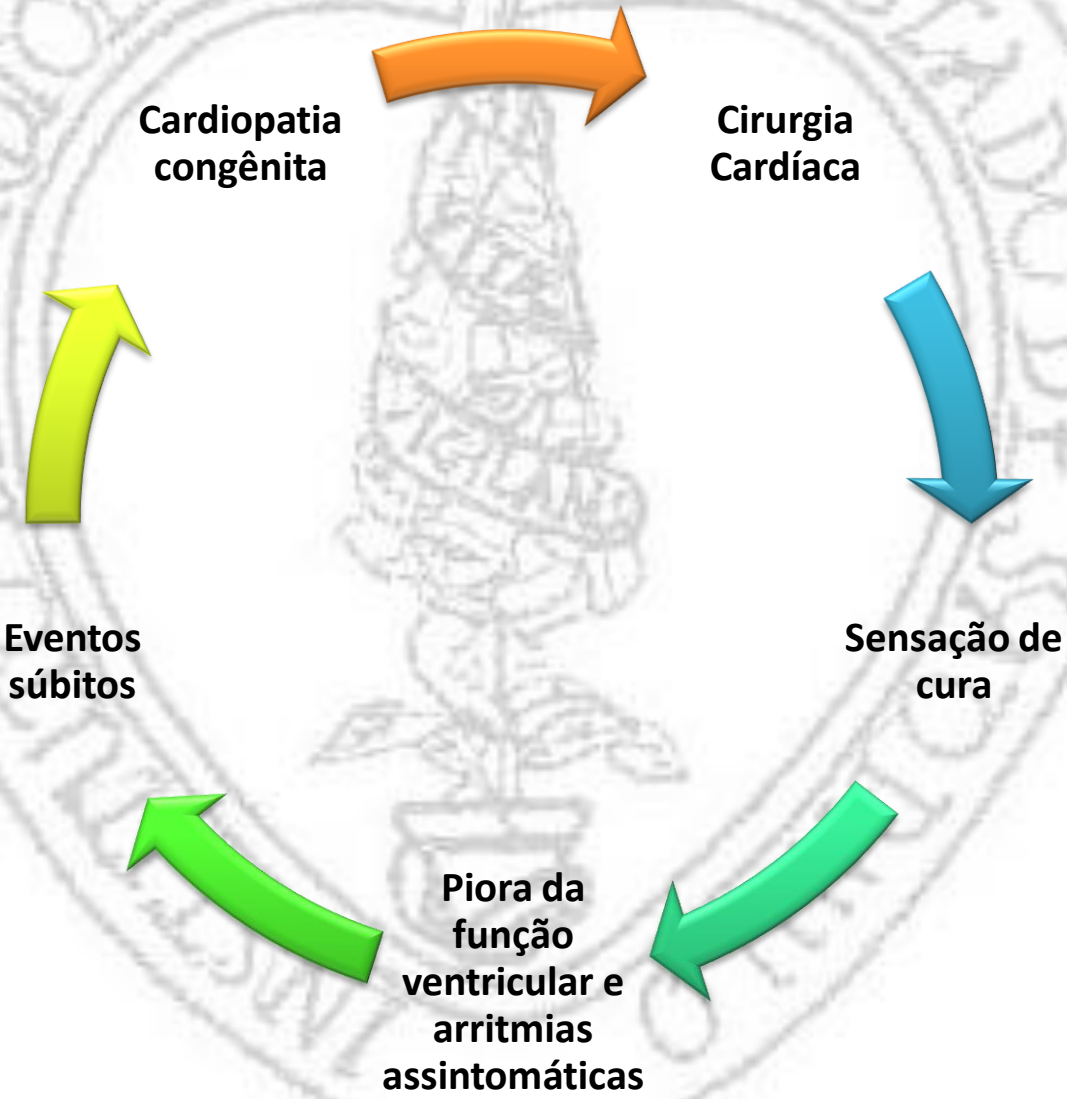
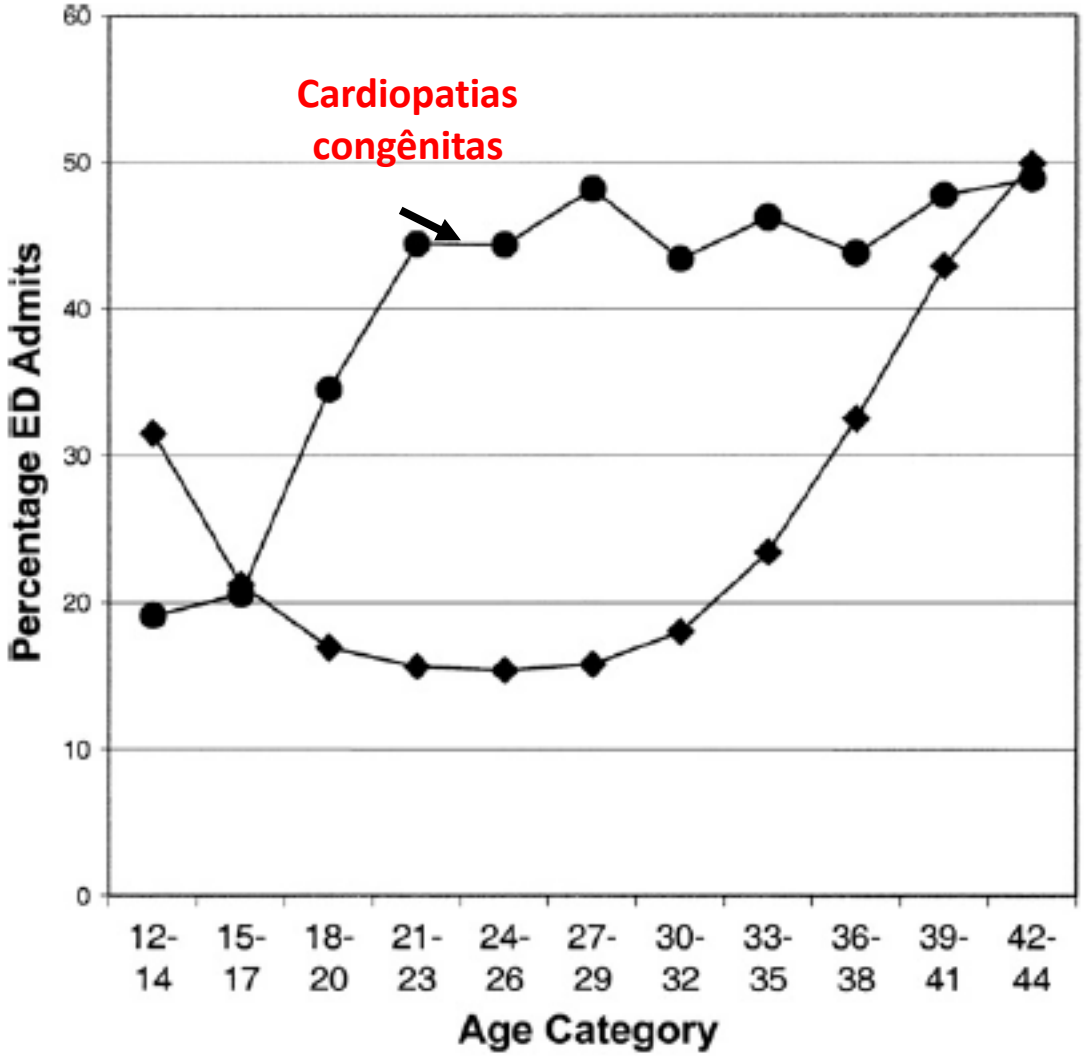
Estresse adrenérgico
Piora da função ventricular e aumento dos substratos
Eventos arrítmicos
Piora da função


Cirurgia Cardíaca
Sensação de cura
Piora da função ventricular e arritmias assintomáticas
Eventos súbitos
Cardiopatia congênita

Changes in Hospitalization Patterns Among Patients With Congenital Heart Disease During the Transition From Adolescence to Adulthood



(J Am Coll Cardiol 2007;49:875–82)

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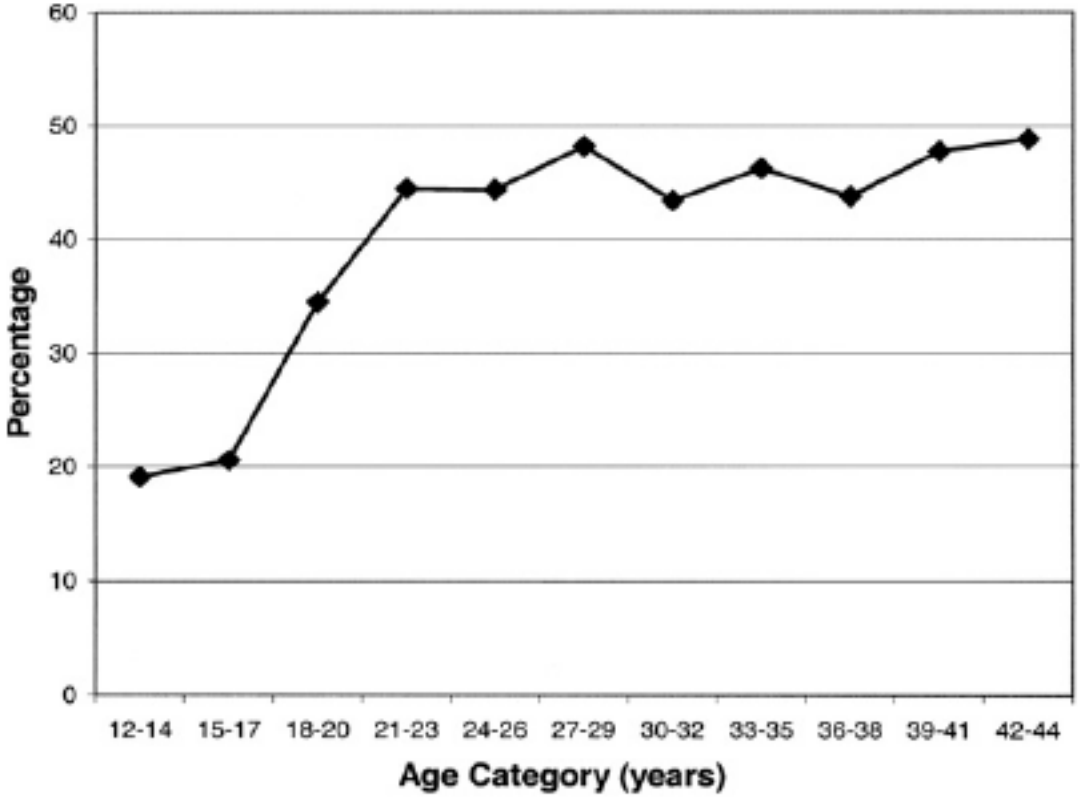

Porcentagem das admissões no PS entre 2000 e 2003 na Califórnia

(J Am Coll Cardiol 2007;49:875–82)

The spectrum of adult congenital heart disease in Europe: morbidity and mortality in a 5 year follow-up period

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VSD	7 (44/621)	2 (14/622)	1 (5/626)	9 (56/617)	3 (18/617)	76 (472/619)	19 (118)	4 (29)
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CoA	2 (11/547)	1 (6/545)	1 (4/546)	4 (21/547)	2 (9/547)	81 (441/543)	15 (84)	3 (18)
Transposition	1 (4/361)	6 (20/359)	0 (1/360)	26 (95/362)	2 (7/362)	67 (244/362)	27 (96)	6 (22)
Marfan syndrome	2 (5/284)	1 (4/285)	1 (2/286)	8 (23/281)	2 (6/281)	79 (223/282)	19 (54)	2 (5)
Fontan circulation	2 (3/198)	12 (23/198)	0 (0/198)	45 (90/198)	0 (0/198)	40 (78/193)	51 (98)	9 (17)
Cyanotic defect	6 (22/386)	10 (37/384)	0 (1/385)	16 (58/374)	6 (22/374)	12 (45/172)	44 (172)	44 (170)
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All values are percentage followed by a fraction with frequency in the numerator and the number of patients with sufficient data to evaluate the item (k/n) in the denominator. In the last two columns only the numerators are given, as the rows of the last three columns sum to 100%.

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EUROPEAN SOCIETY OF CARDIOLOGY®

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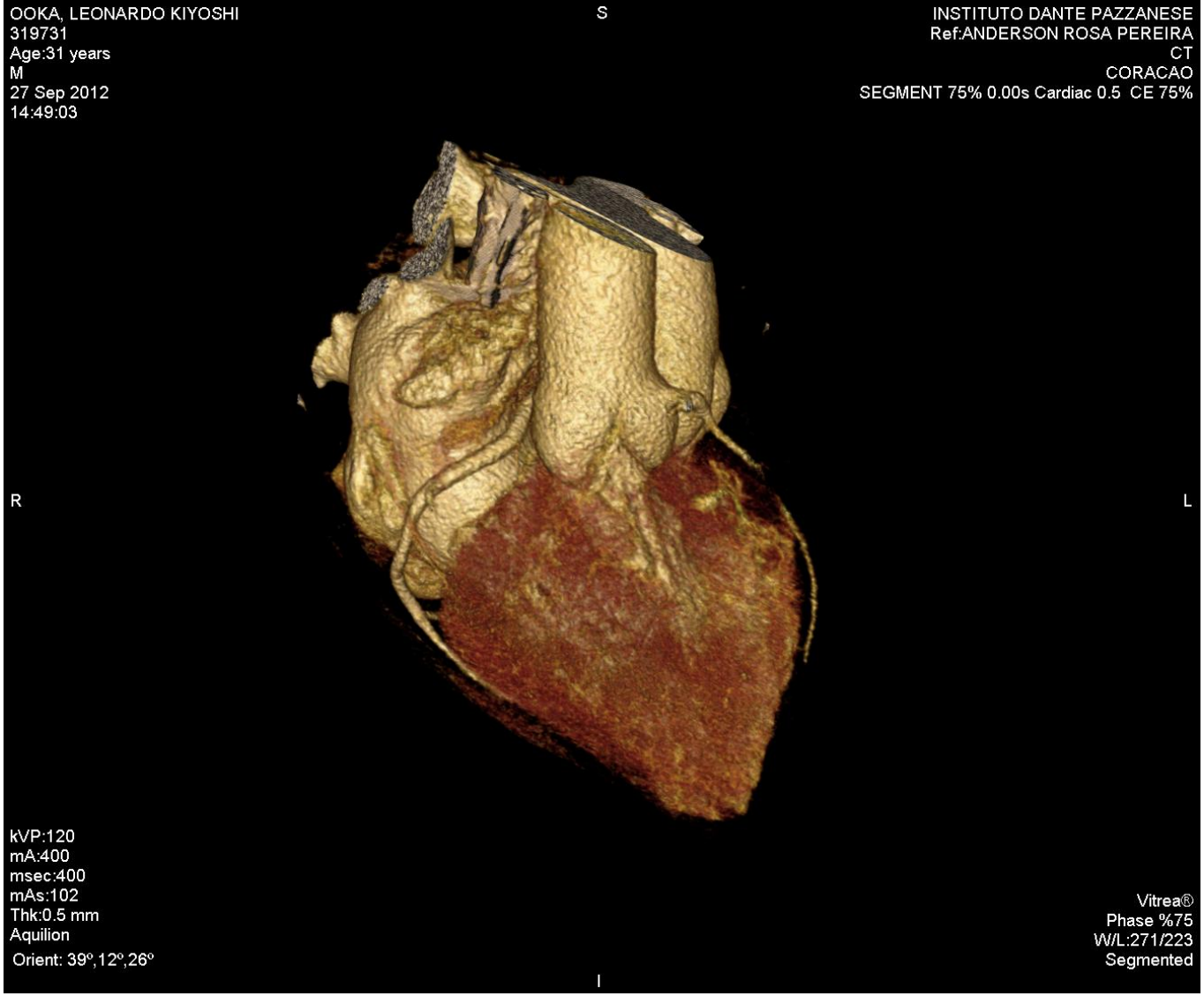
Seção Médica de Eletrofisiologia Clínica e Arritmias Cardíacas
Instituto Dante Pazzanese de Cardiologia



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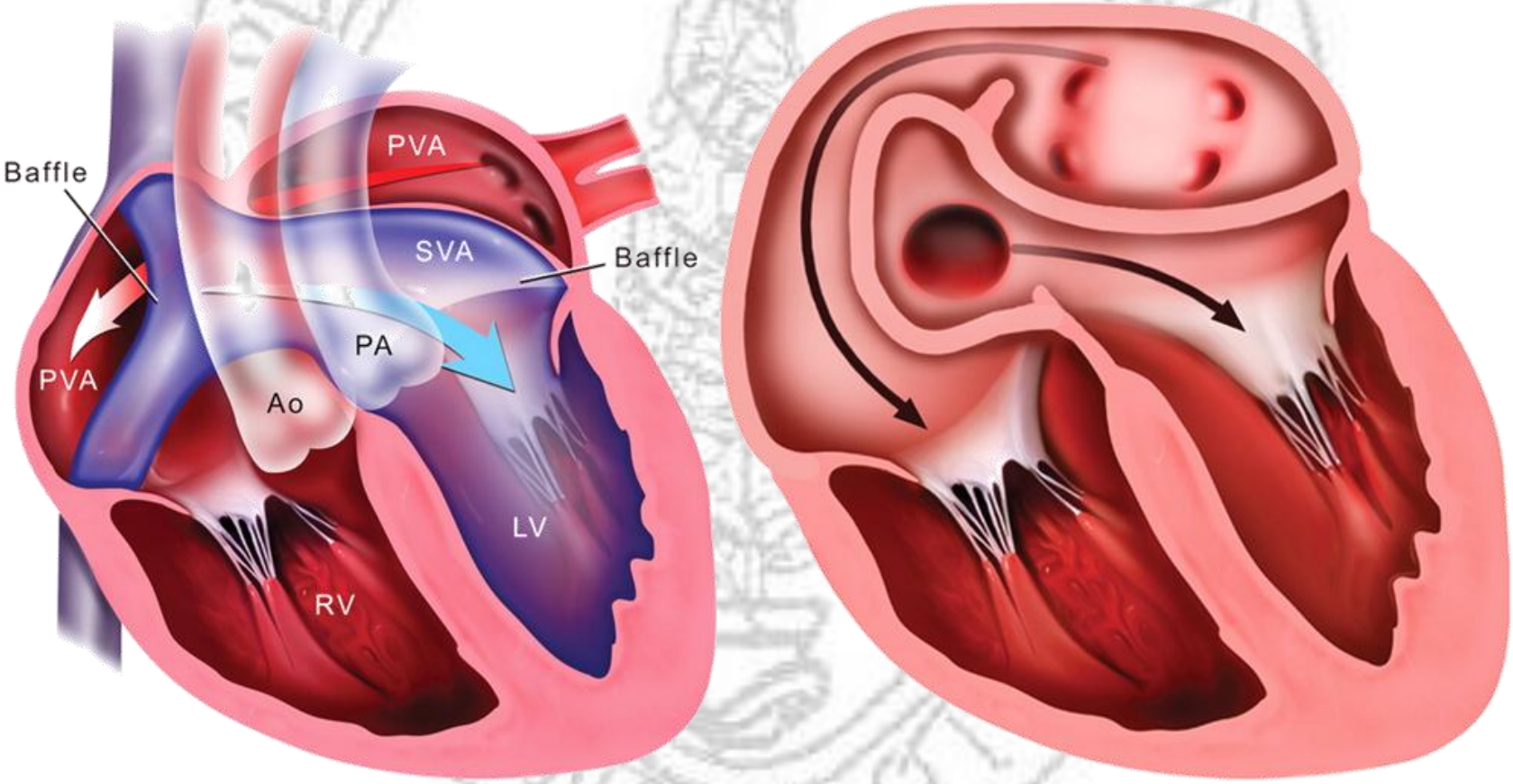
Baffle
PVA
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Baffle
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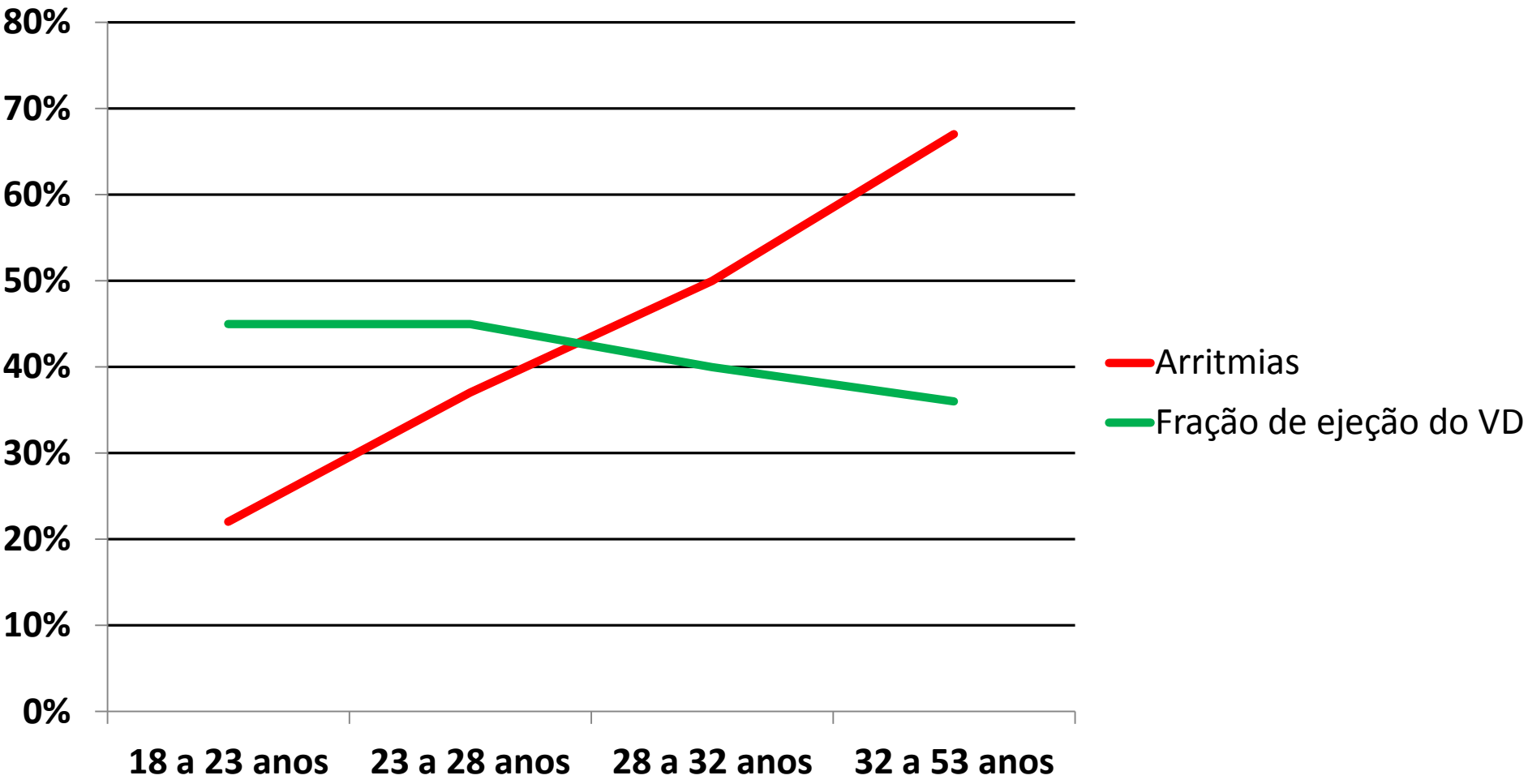
RV

INSTITUTO DE CARDIOLOGIA DO ESTADO DE SÃO PAULO

European Heart Journal (2009) **30**, 1873–1879

CLINICAL RESEARCH



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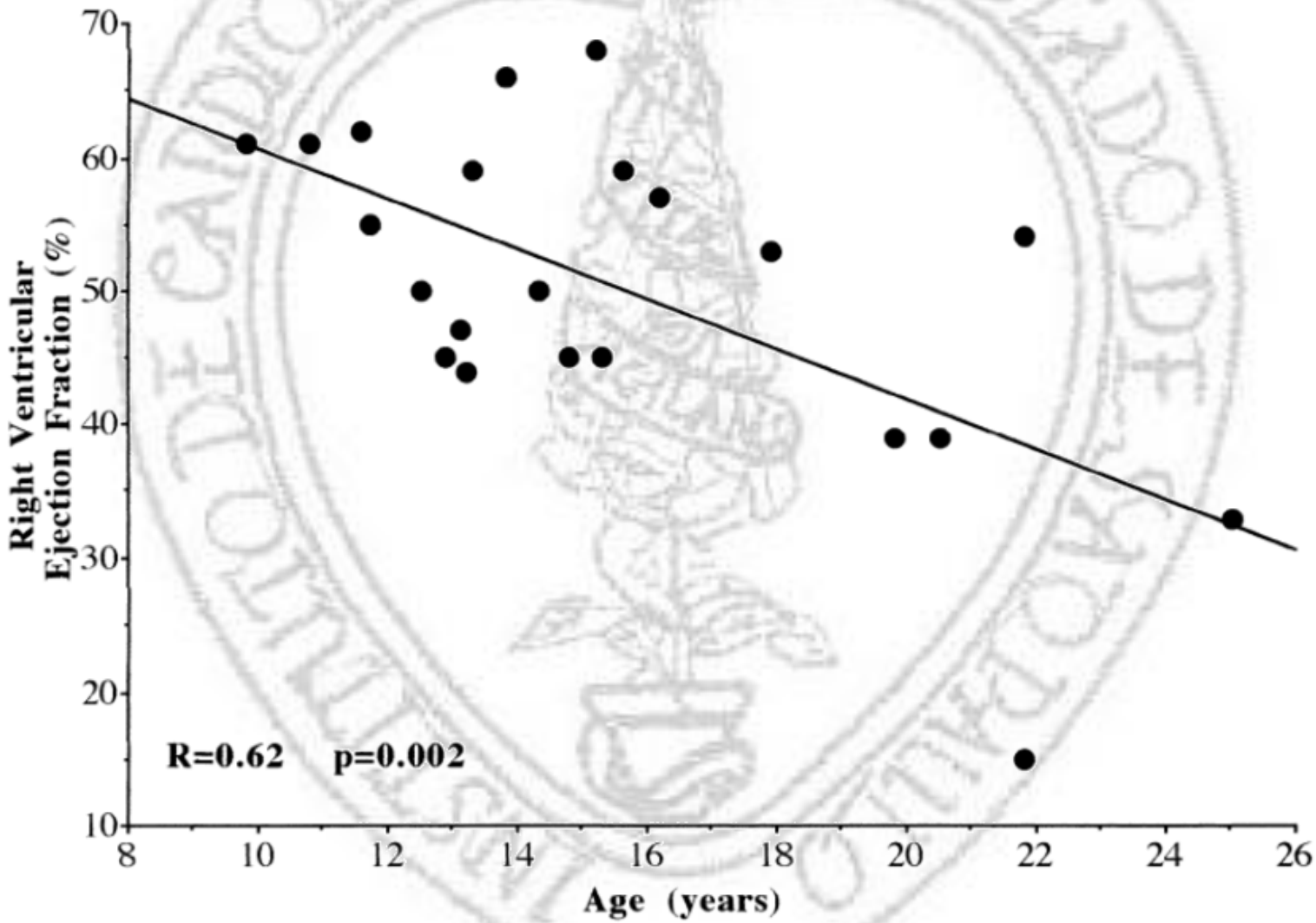
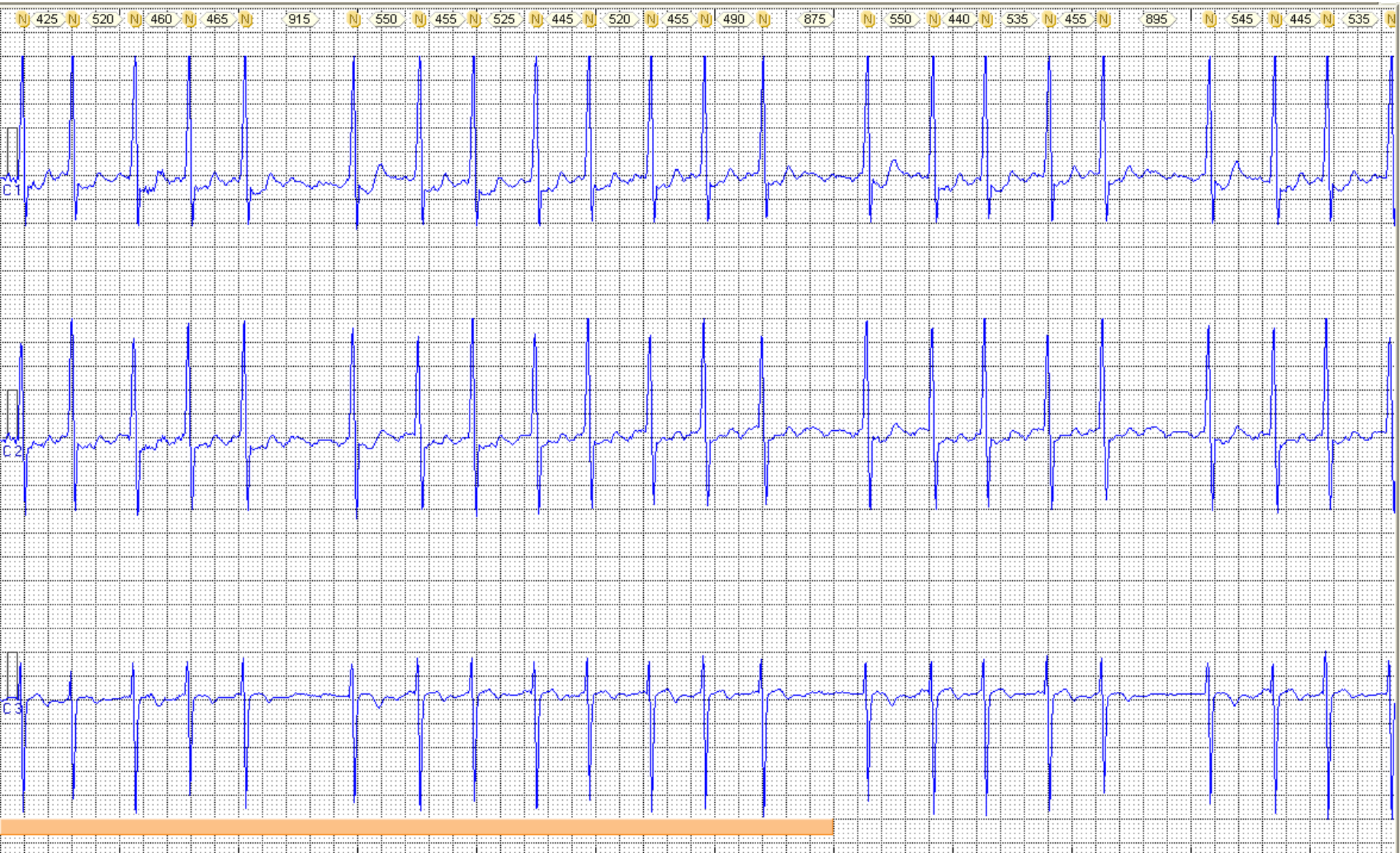


Milane et al JACC 2000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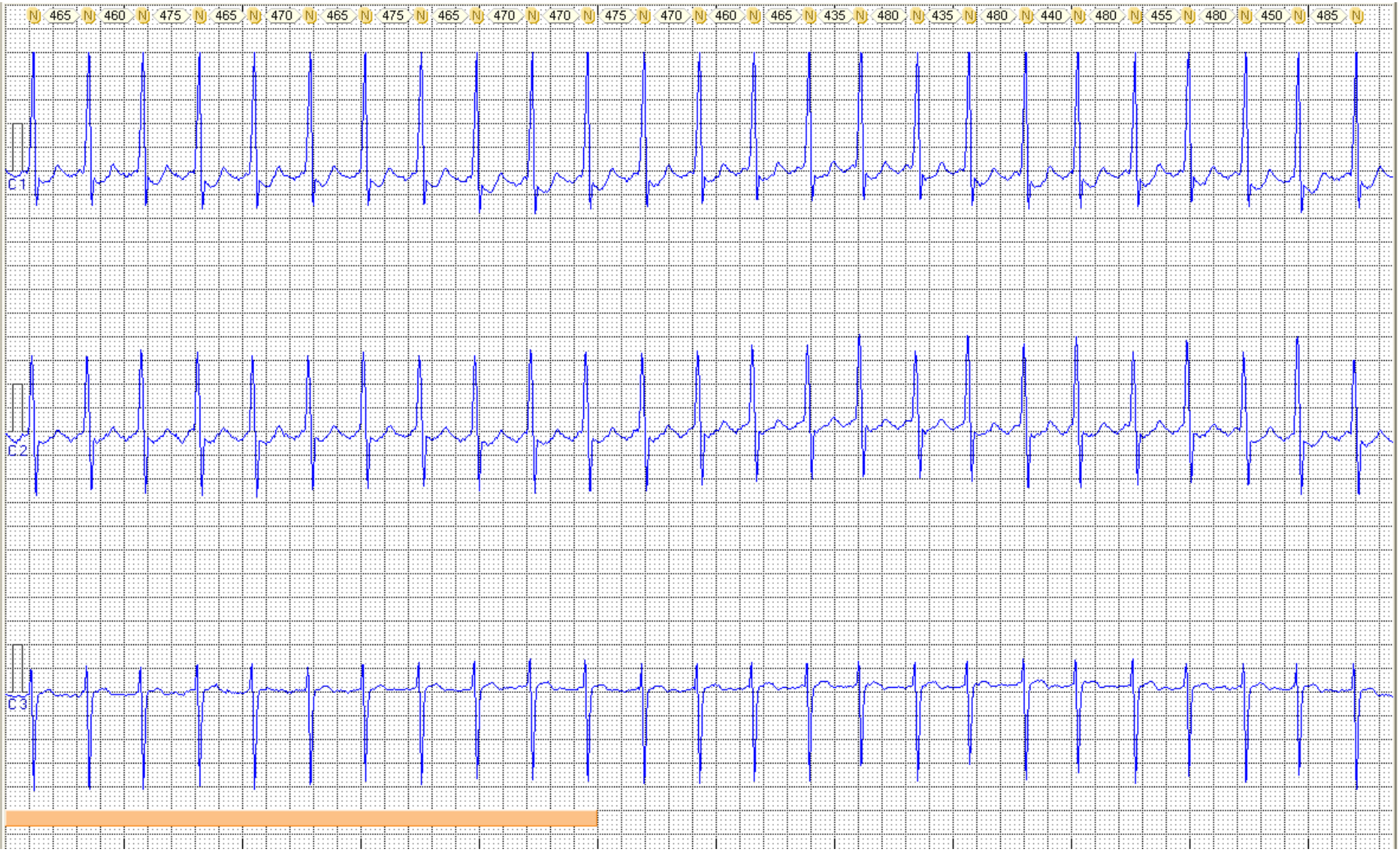
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C2
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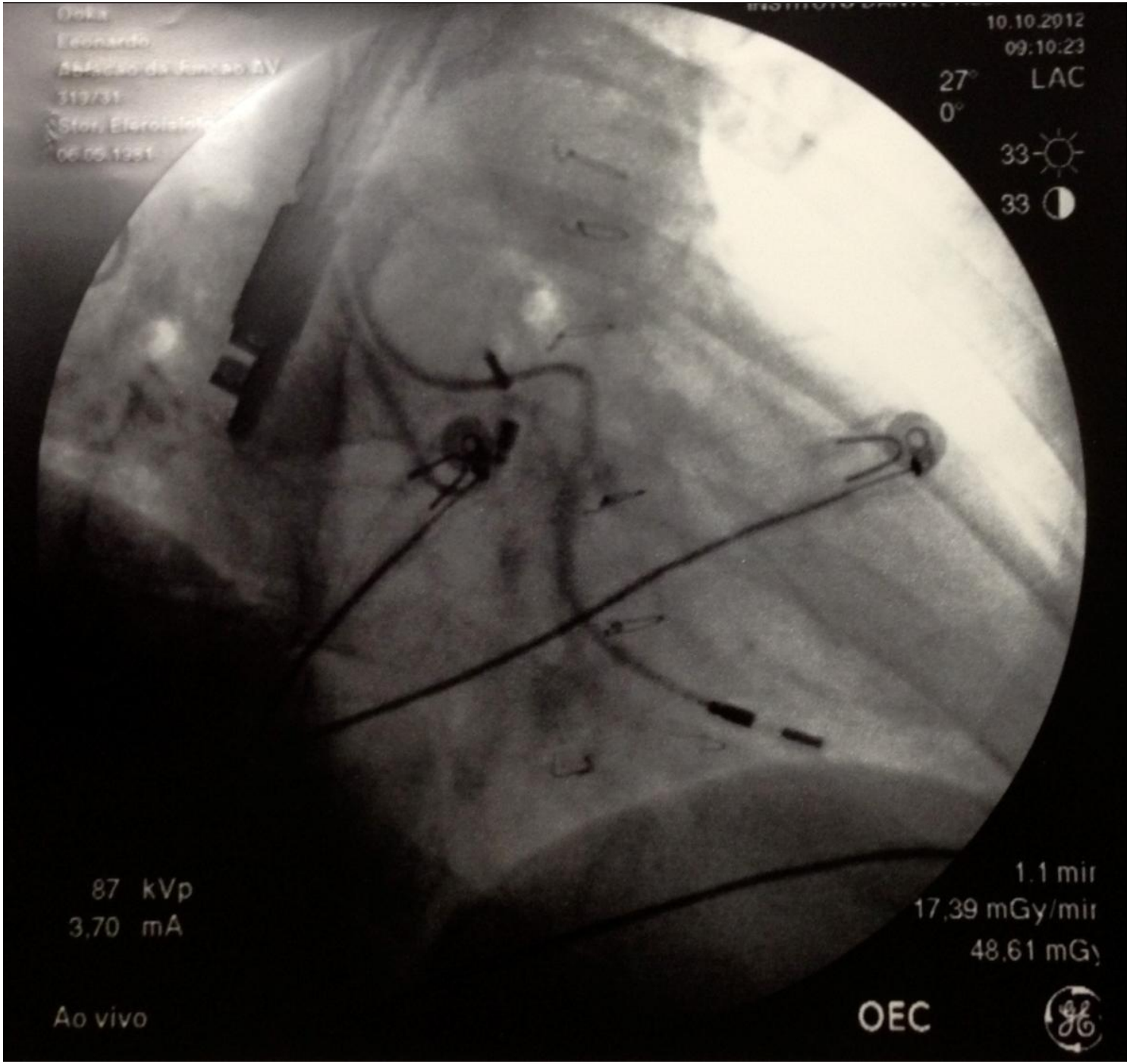
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LAC
0°
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33
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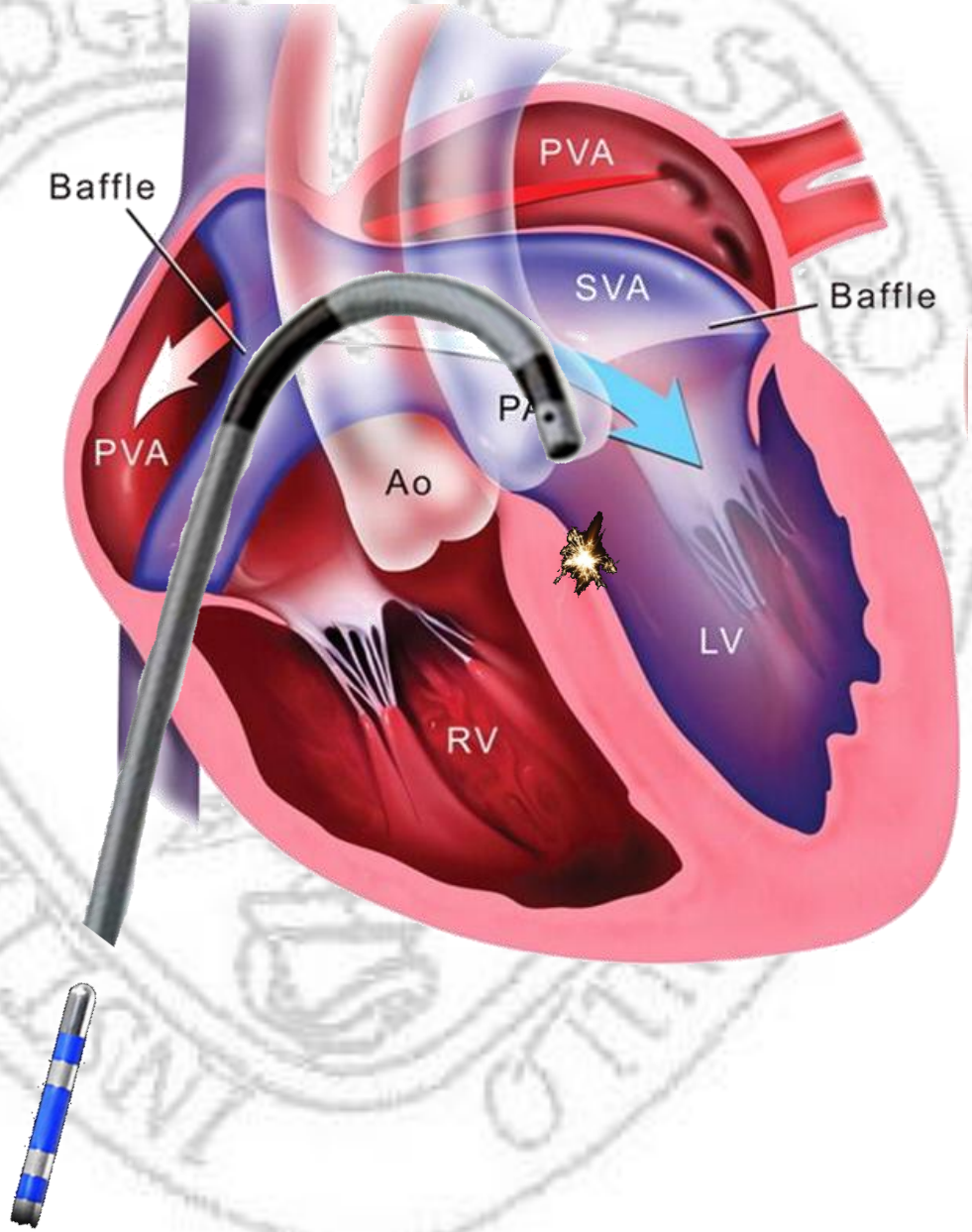
3,70 mA
1.1 mir
17,39 mGy/mir
48,61 mGy
Ao vivo
OEC


Baffle
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Baffle
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PVA
Ao
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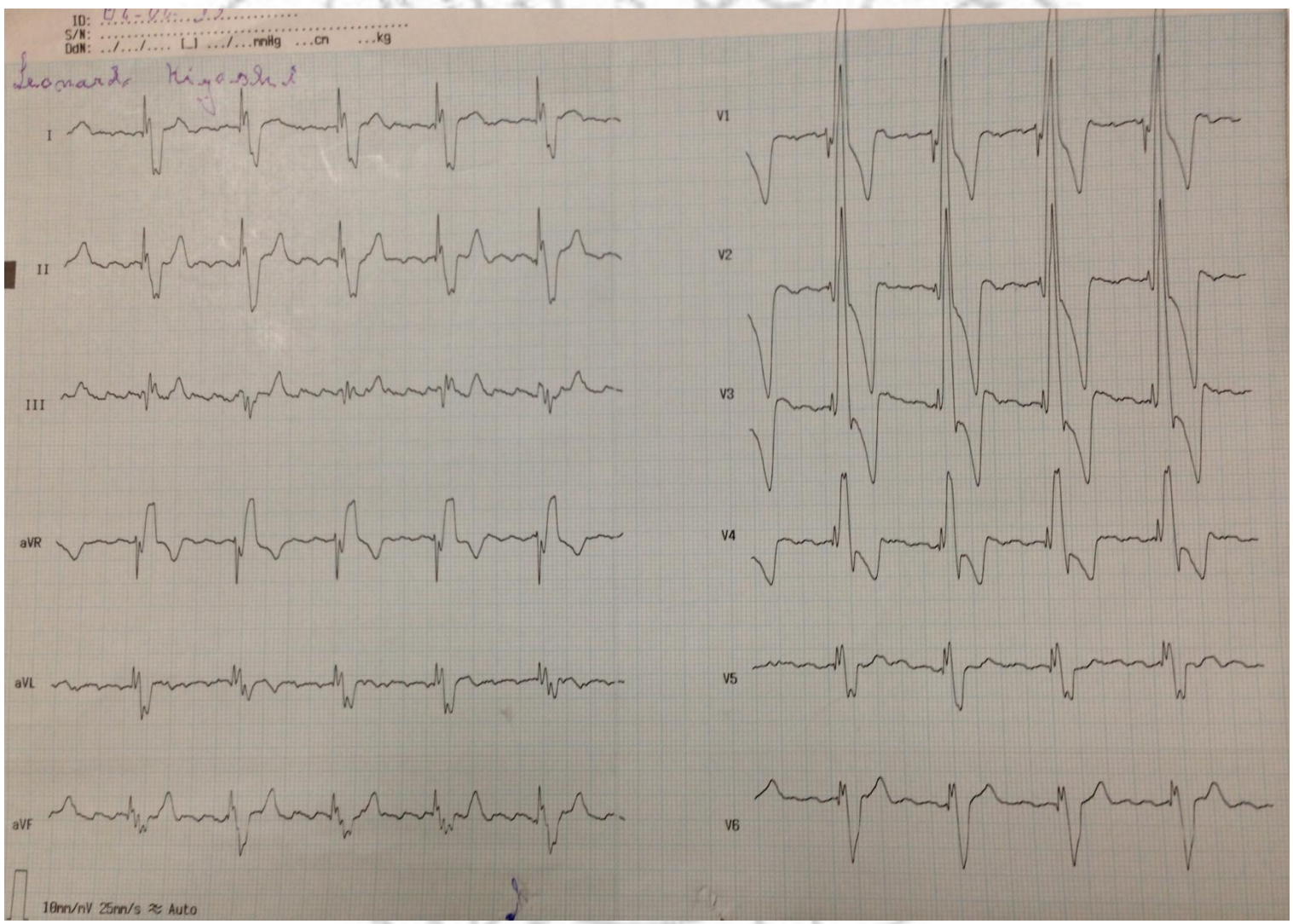
RV


ID:
S/N:
DdN: ../.../.... [_] .../...mmHg ...cm ...kg
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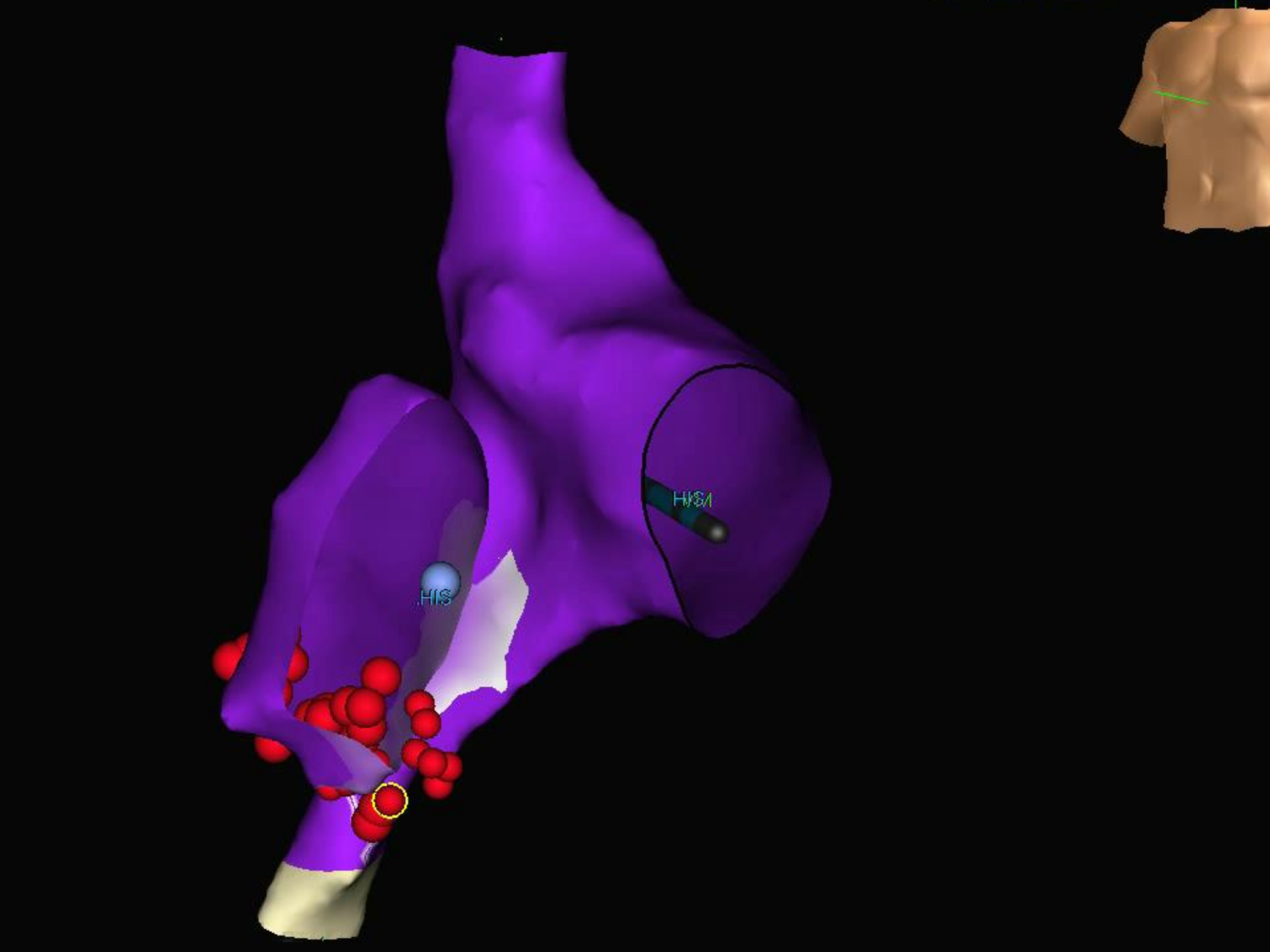
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
10mm/mV 25mm/s ≈ Auto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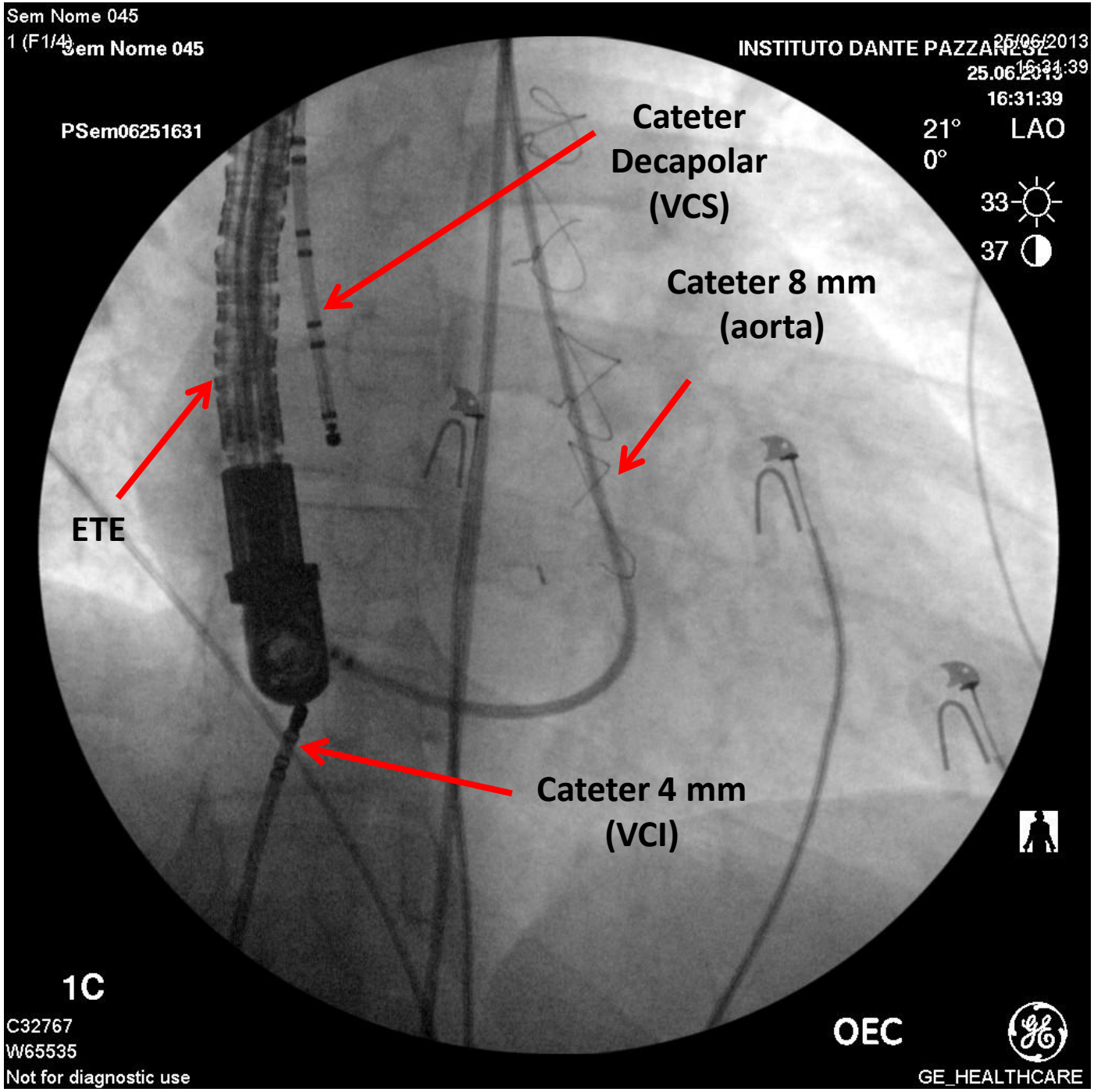
HIS1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21°
LAO
0°
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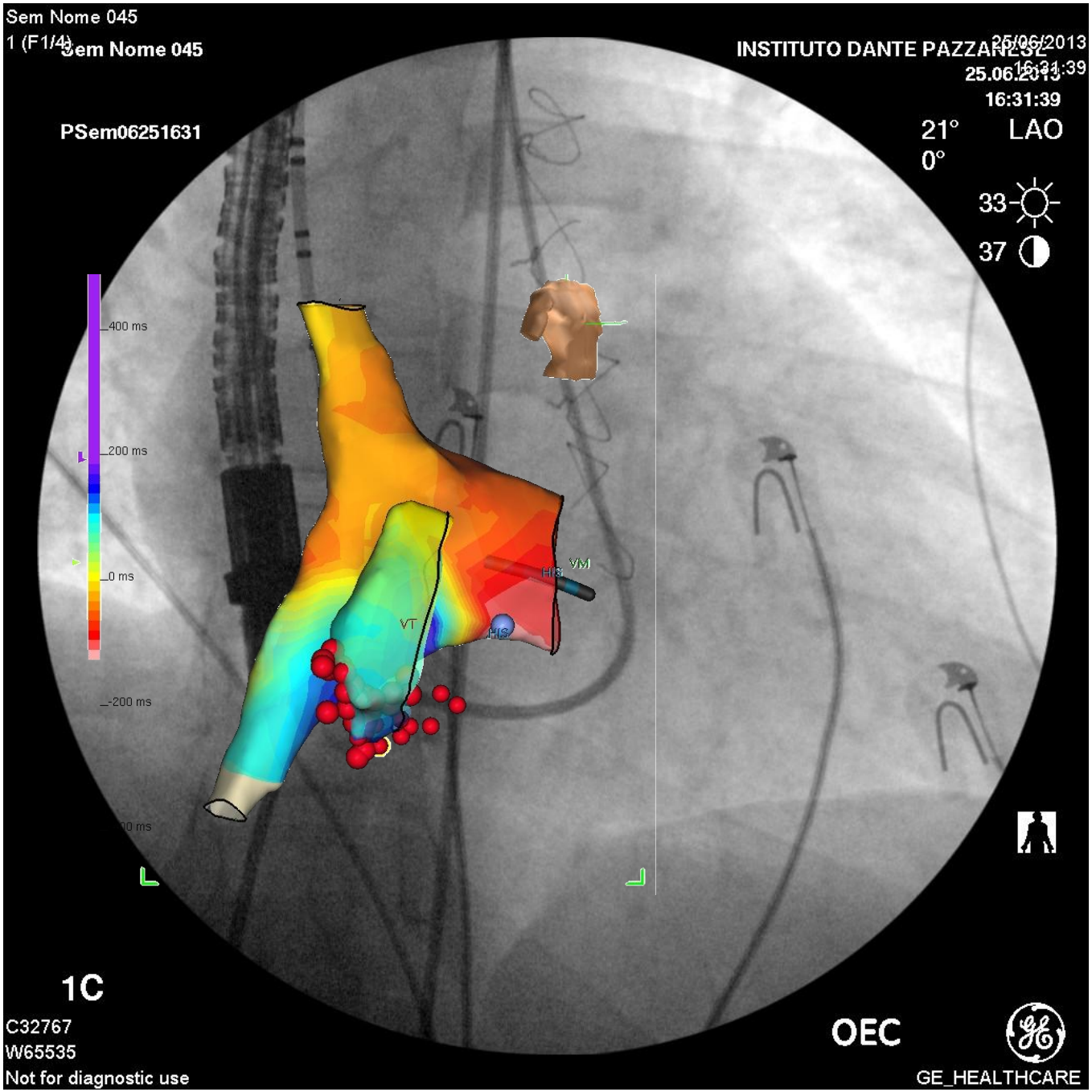
37
Cateter
Decapolar
(VCS)
Cateter 8 mm
(aorta)
ETE
Cateter 4 mm
(VCI)
1C
C32767
W65535
Not for diagnostic use
OEC
GE_HEALTHCARE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25/06/2013
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LAO
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VM
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W65535
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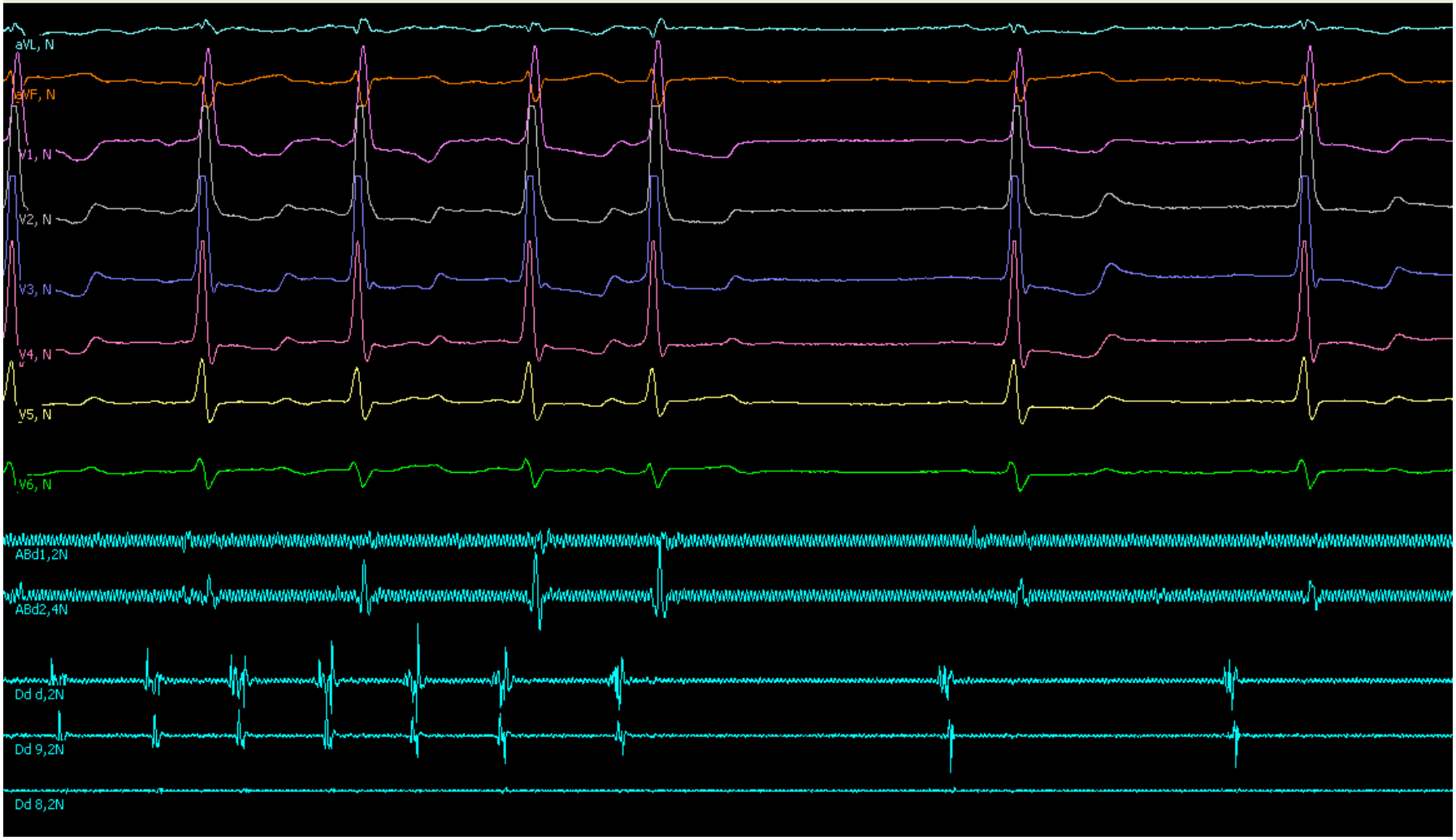
GE_HEALTHCARE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aVF, N
V1, N
V2, N
V3, N
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V6, N
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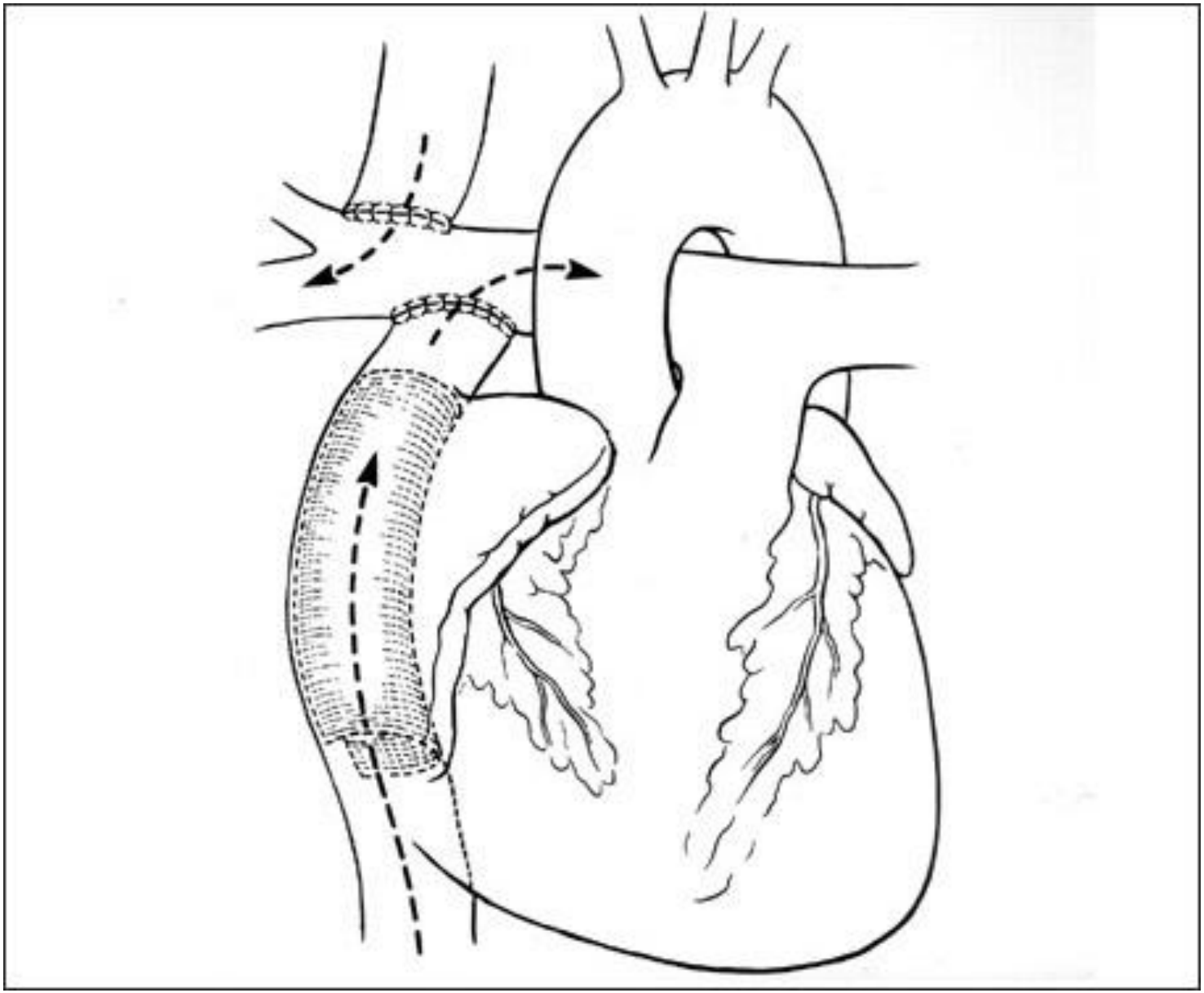

Five- to Fifteen-Year Follow-up After Fontan Operation

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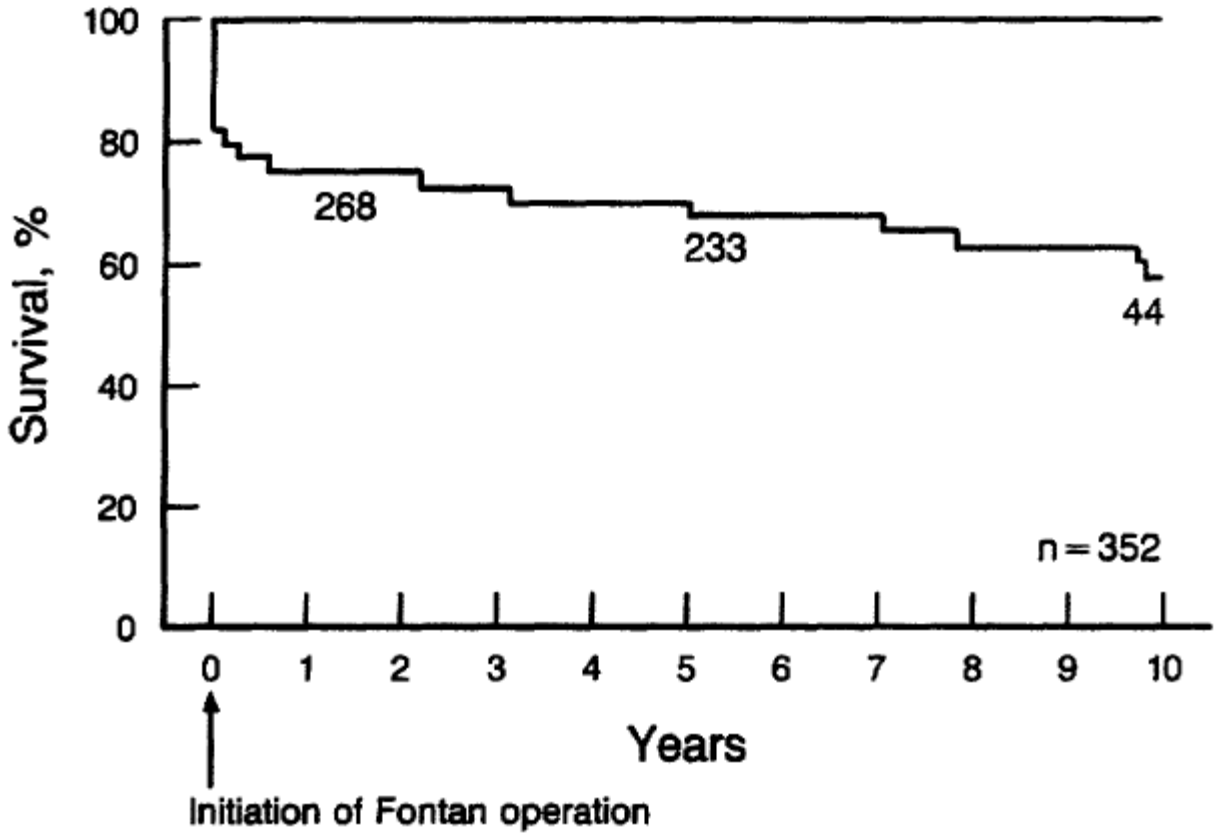
Hartzell V. Schaff, MD; Francisco J. Puga, MD; and Gordon K. Danielson, MD



Circulation *Vol 85, No 2 February 1992*

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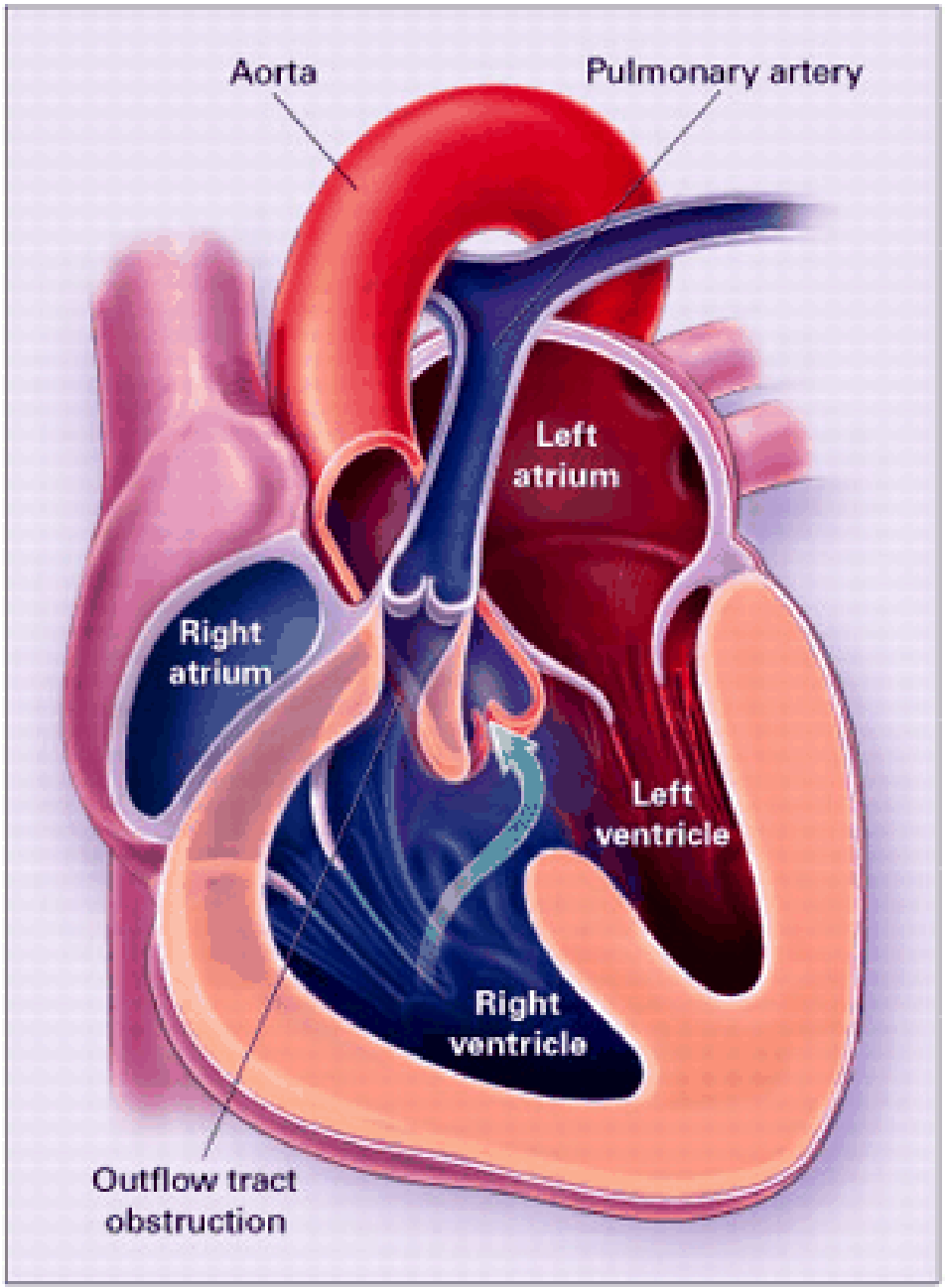
Indicatio
Cardiac
Other
Arrhythm
Pacemak
Heart fai
Abdomin
Leg eden
Endocarc
Protein-l
Hypopro
Stroke
Liver pro
Brain abs

TABLE 5. Mode of Death for 122 Patients*

Cause of death	Patients (No.)
Cardiovascular related	91
Ventricular failure	73
Renal failure or insufficiency	29
Respiratory failure or insufficiency	19
Sepsis	14
Sudden and unexpected	11
Arrhythmia	13
At cardiac reoperation	7
Bleeding	8
Hepatic failure or insufficiency	5
Brain death	7
Pulmonary embolus	3
Cardiac tamponade	1
Accidental	1
Unknown	8


Aorta
Pulmonary artery
Left atrium
Right atrium
Left ventricle
Right ventricle
Outflow tract obstruction

Morte súbita no Fallot

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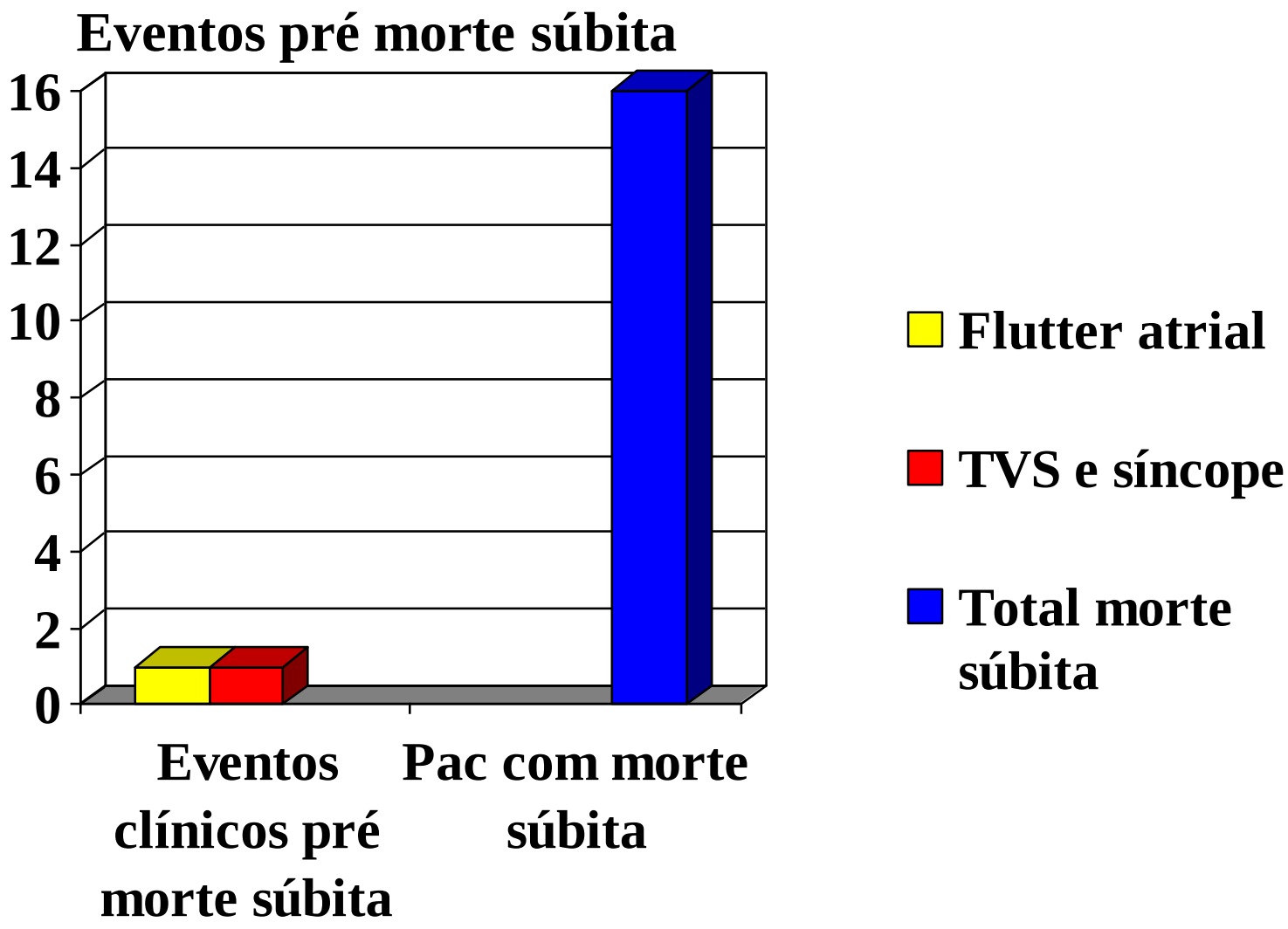
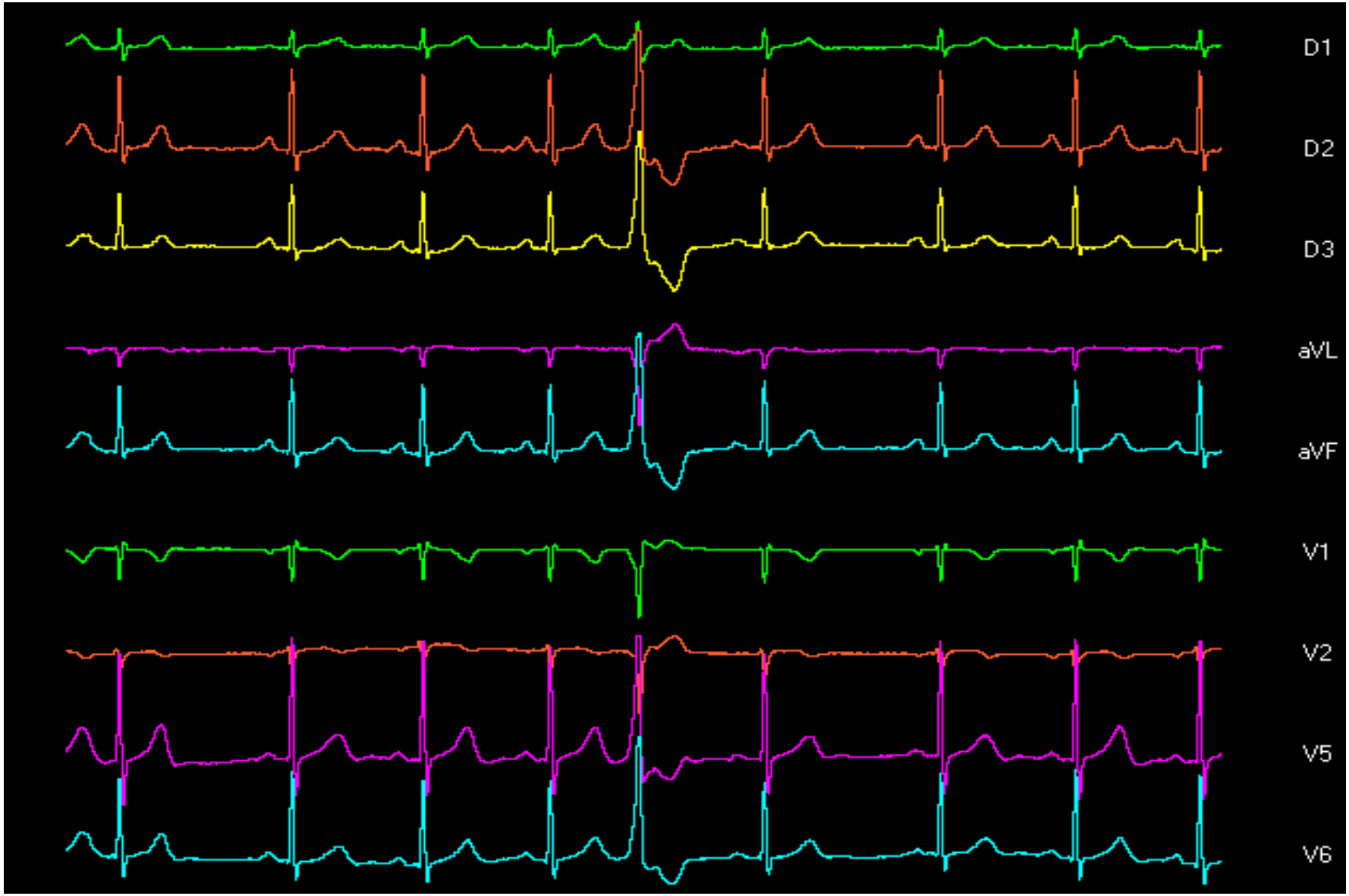


Risk factors for arrhythmia and sudden death late after repair of tetralogy of Fallot: a multicenter studyLancet setembro 2000

Mecanismos arritmia

- Ventriculotomia
- Atriotomia
- Cicatrização irregular e ilhas de músculo cardíaco normal
- Dilatação camaras direitas e áreas de fibrose

ARRITMIA DE V.D.



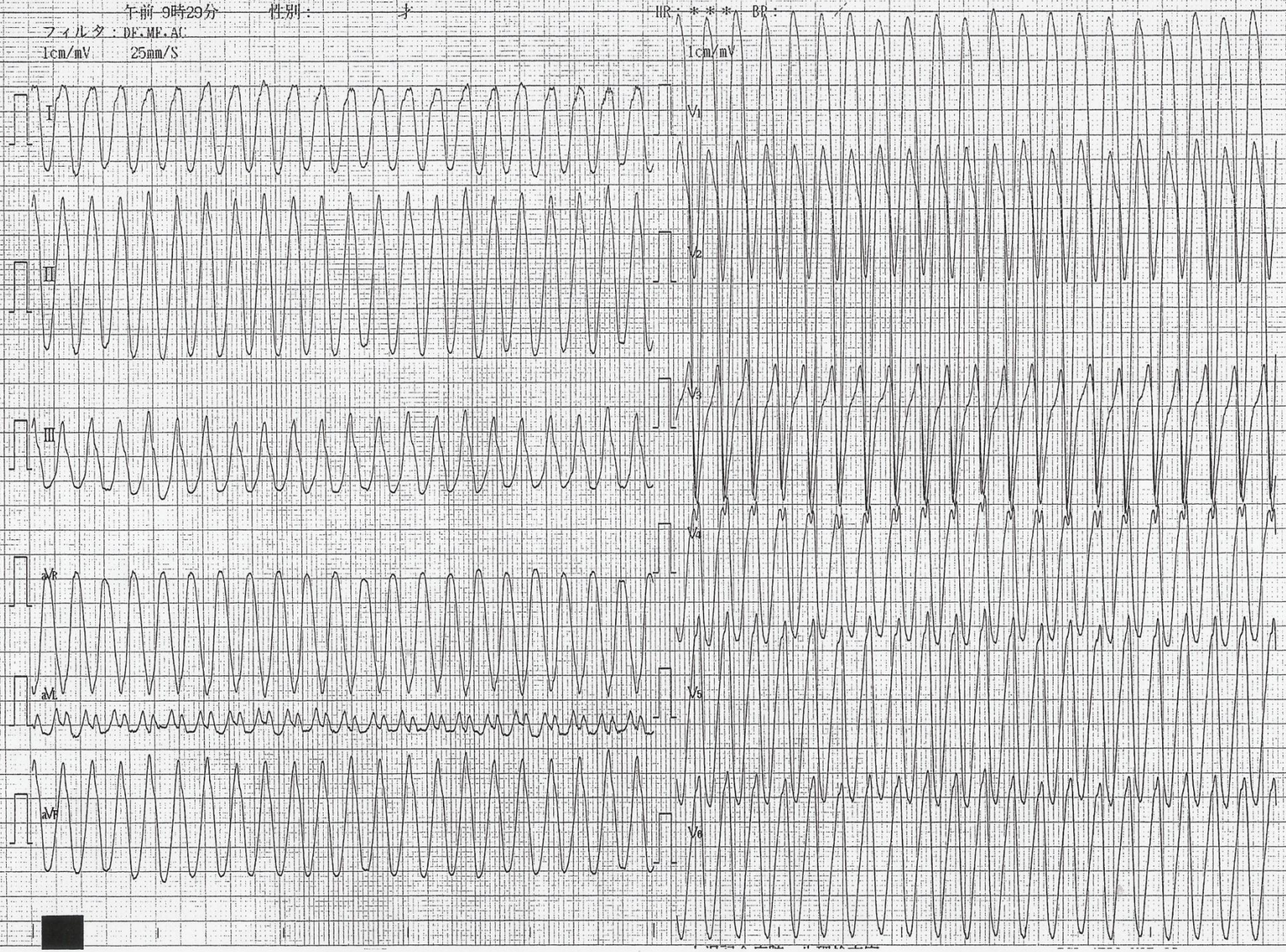
[redacted]

安静時　08年 5月12日　ＩＤ：０００００００７　氏名：

午前 9時29分　性別：　才　HR：＊＊＊　BP：

フィルタ：DF.MF.AC

1cm/mV　25mm/S



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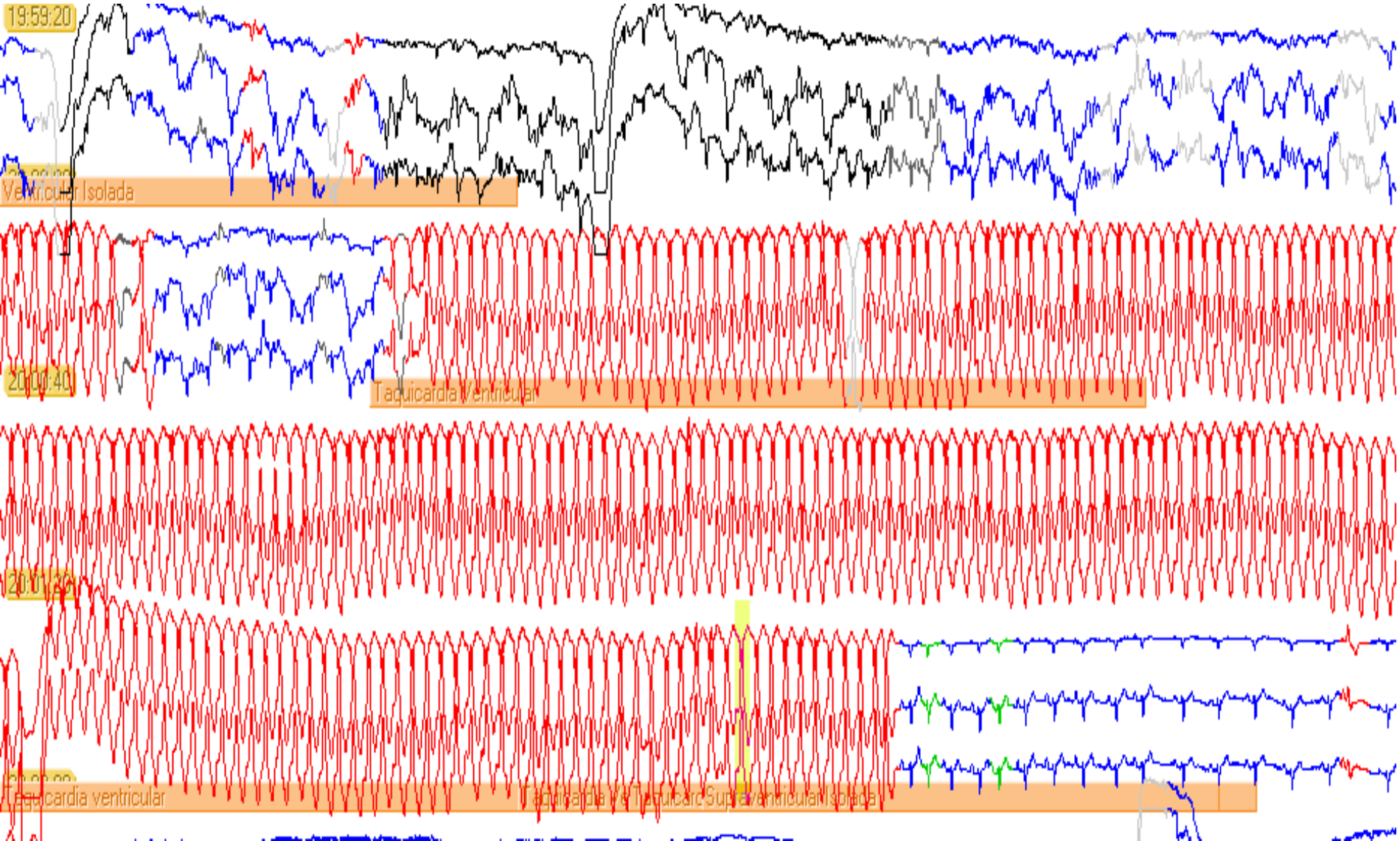
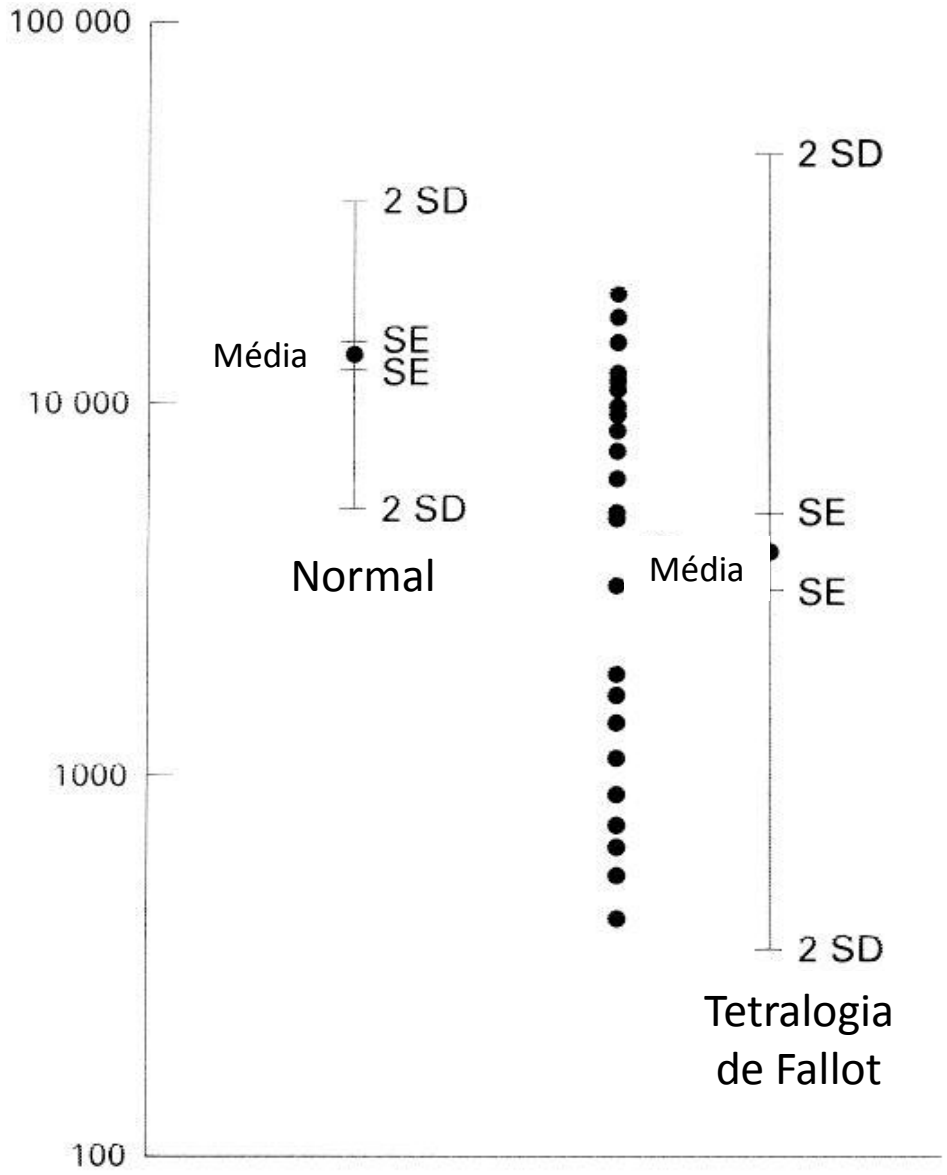

19:59:20
Ventricular Isolada
20:00:40
Taquicardia Ventricular
20:01:20
Taquicardia ventricular
Taquicardia Supraventricular Isolada

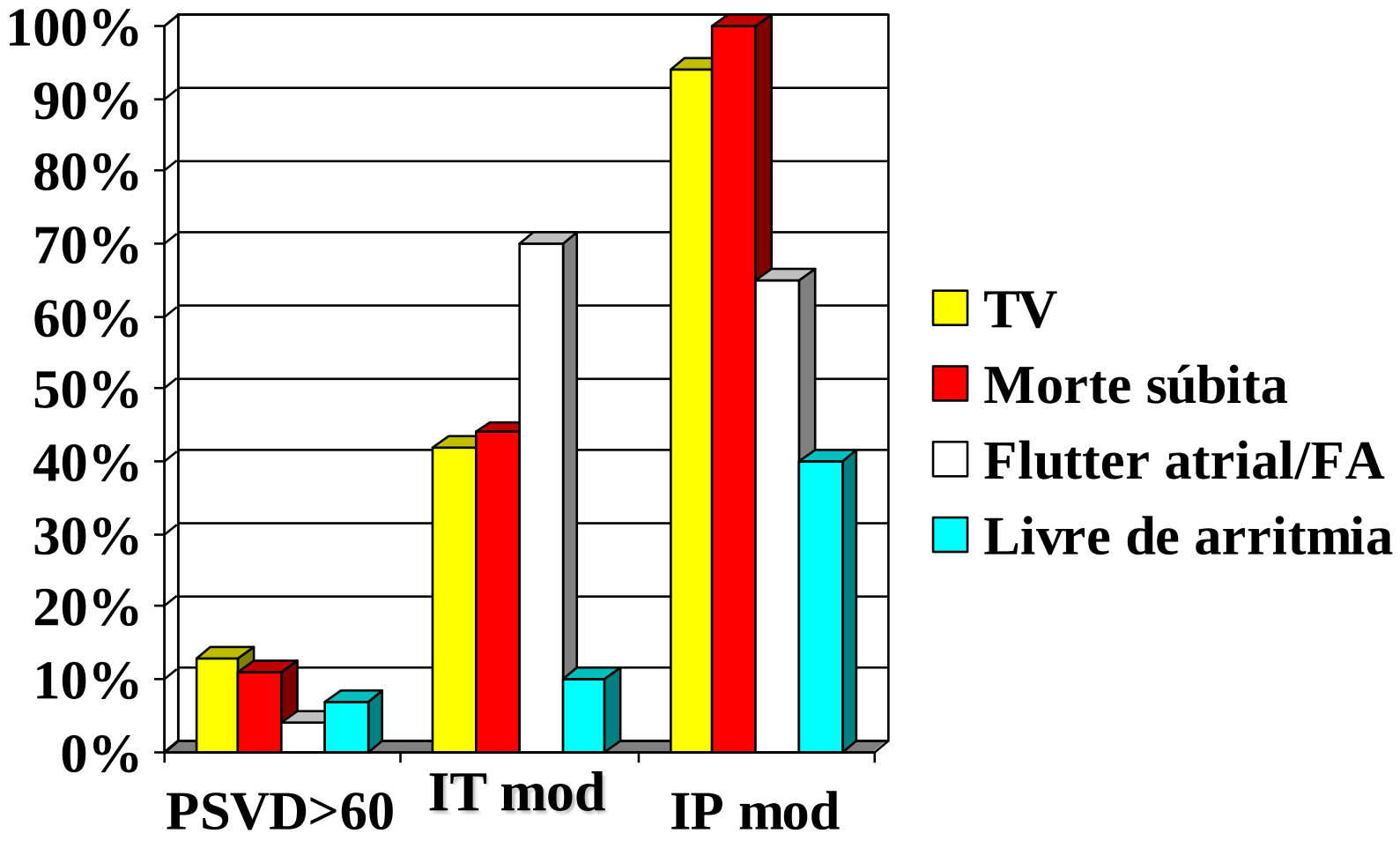
Variabilidade da FC na Tetralogia de Fallot



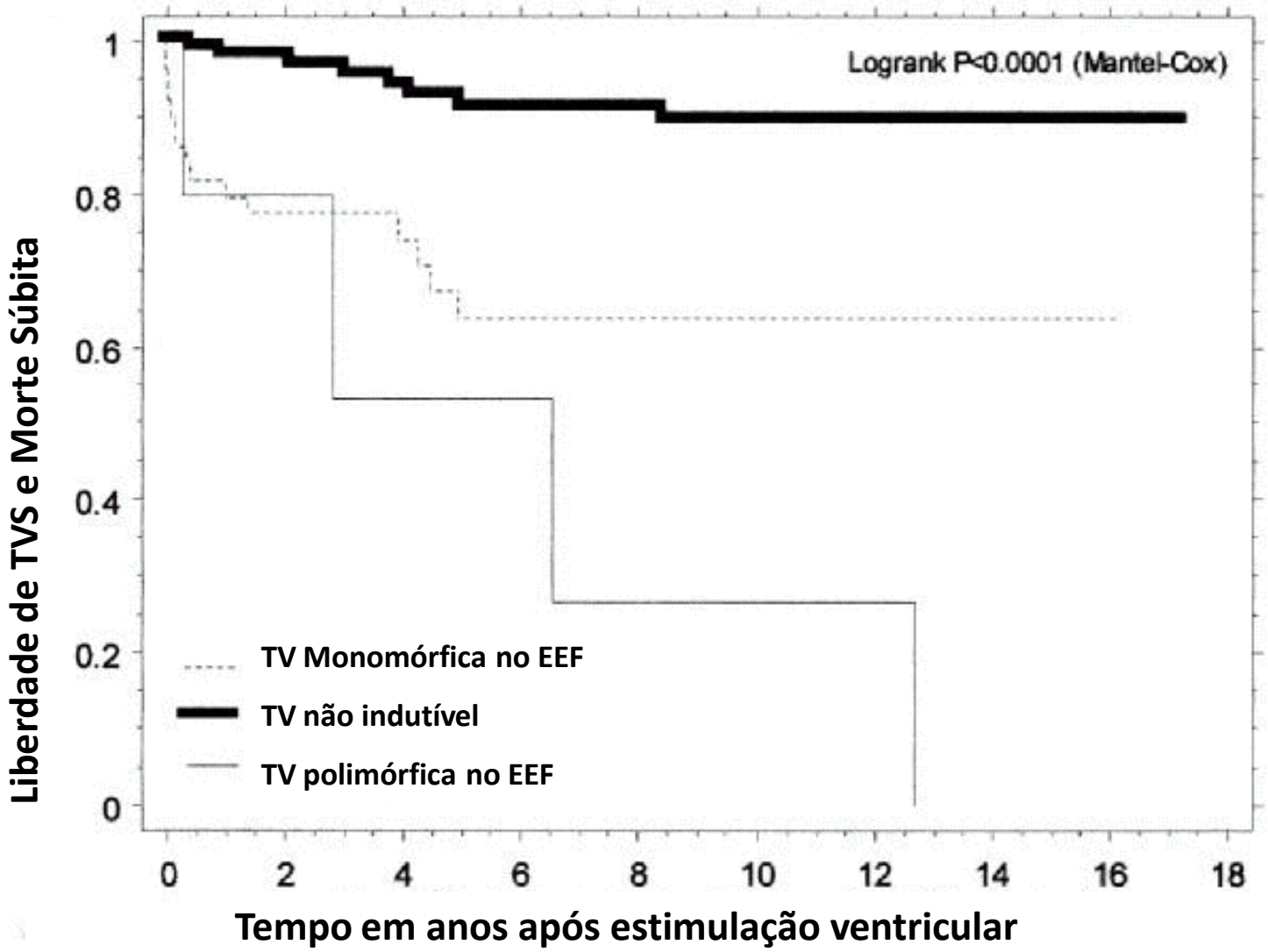
Reduced heart variability fallowing repair of tetralogy Fallot – Heart 1999; 81: 656-660

Arritmias no Fallot

Avaliação ecocardiográfica de 456 pacientes – pré eventos



Risk factors for arrhythmia and sudden death late after repair of tetralogy of Fallot: a multicenter studyLancet setembro 2000



Value of Programmed Ventricular Stimulation After Tetralogy of Fallot Repair-
Circulation, 2004; 109: 1994-2000

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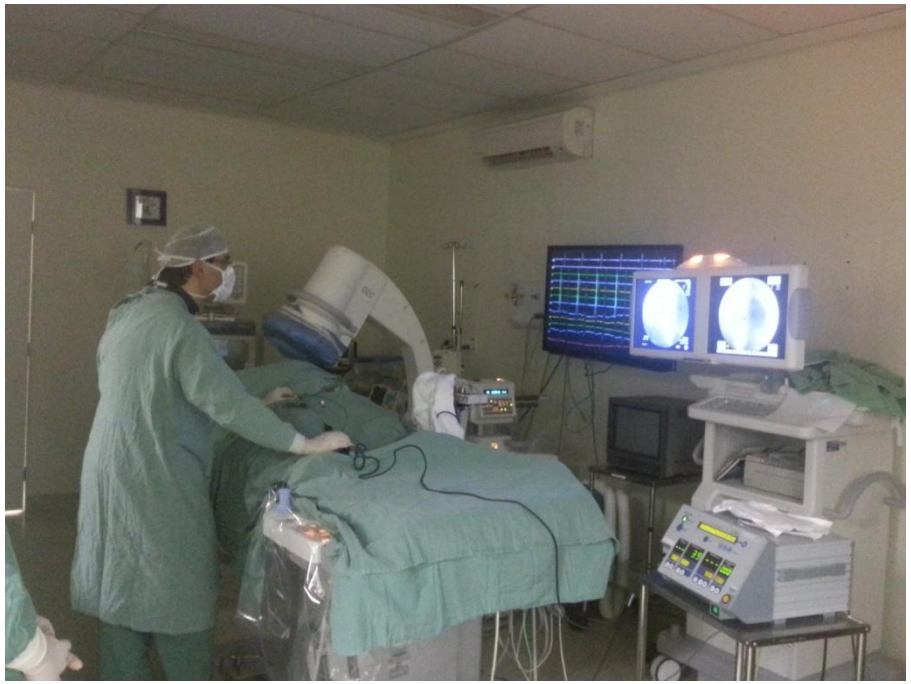

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Obrigado!!!

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