# ΠΑΡΟΥΣΙΑΣΗ ΠΕΡΙΣΤΑΤΙΚΟΥ
# ARRHYTHMIAS UPDATE

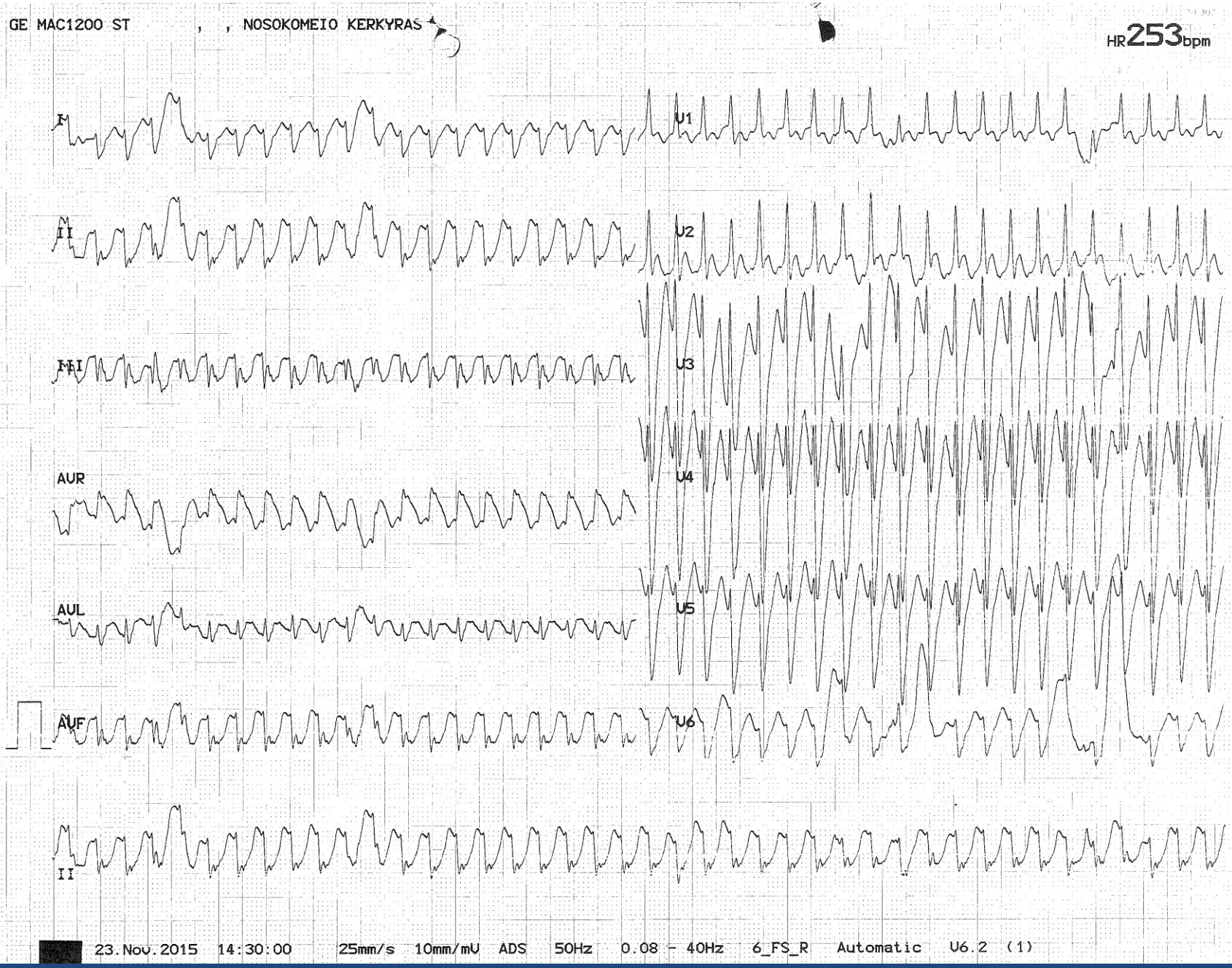
ΓΙΑΝΝΗΣ ΜΠΑΛΤΟΓΙΑΝΝΗΣ
ΚΑΡΔΙΟΛΟΓΟΣ
ΙΩΑΝΝΙΝΑ

# ΠΑΡΟΥΣΙΑΣΗ ΠΕΡΙΣΤΑΤΙΚΟΥ

- ✓ 3 ετών-IVF-καισαρική τομή
- ✓ 11/2015 λοίμωξη αναπνευστικού με εμπύρετο
- ✓ Περιστοματική κυάνωση-εφίδρωση-έμετο (διάρκεια 20 min)
- ✓ Γ.Ν. Κέρκυρας χωρίς παθολογικά ευρήματα

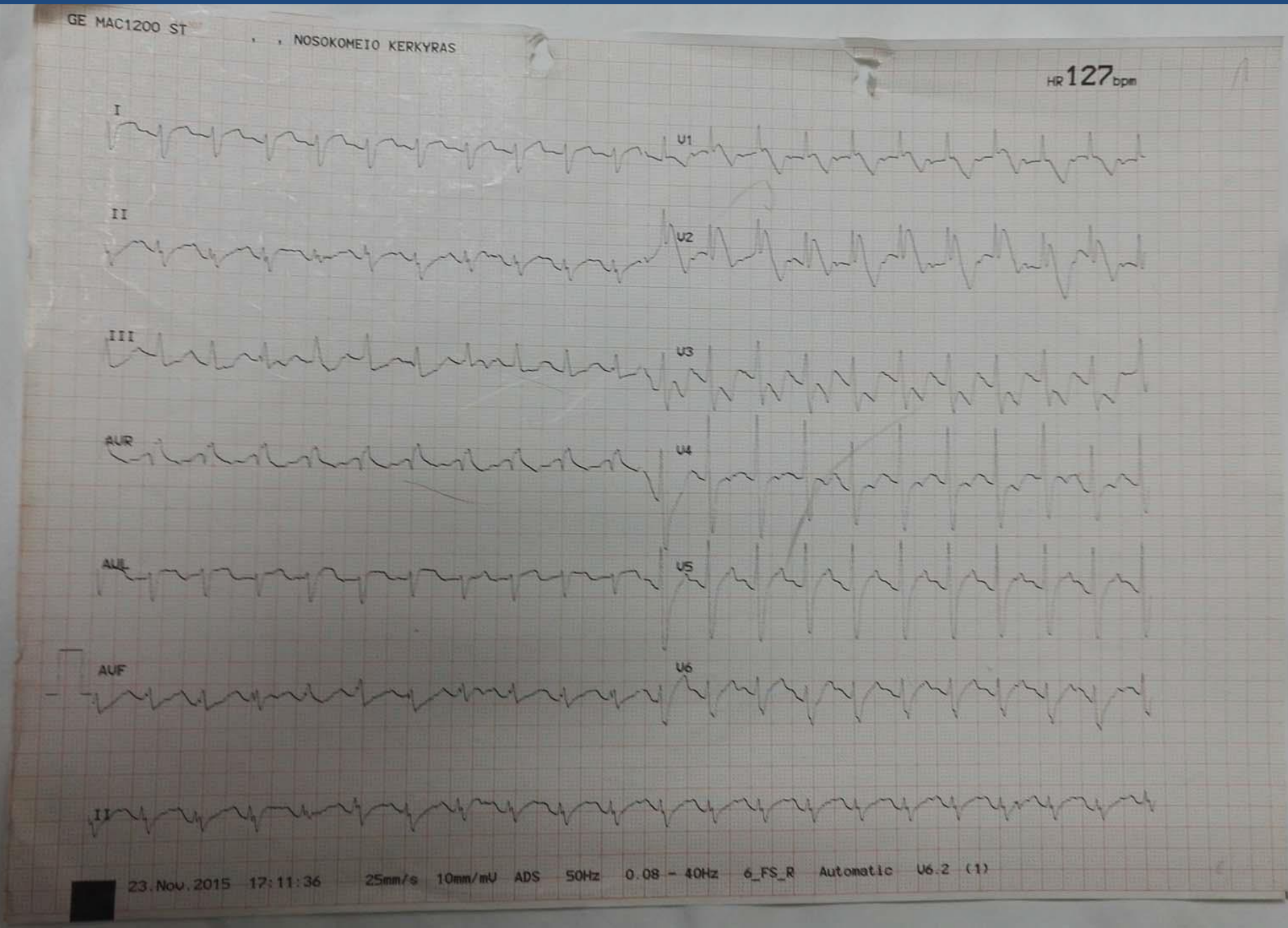
# ΠΑΡΟΥΣΙΑΣΗ ΠΕΡΙΣΤΑΤΙΚΟΥ

- ✓ 24h μετά παρόμοιο επεισόδιο (220bpm)
- ✓ Μεγαλύτερη διάρκεια
- ✓ Νοσοκομείο


GE MAC1200 ST , , NOSOKOMEIO KERKYRAS
HR 253 bpm
I
II
III
AUR
AUL
AUF
V1
V2
V3
V4
V5
V6
II
23.Nov.2015 14:30:00 25mm/s 10mm/mV ADS 50Hz 0.08 - 40Hz 6_FS_R Automatic V6.2 (1)

# VT

- ✓ Χορήγηση προκαϊναμίδης 0.3 mg/kgr
  → αποτυχία
- ✓ Επανάληψη της δόσης σε 10 λεπτά
  → αποτυχία
- ✓ Αιμοδυναμική επιβάρυνση
  → DC shock


GE MAC1200 ST
NOSOKOMEIO KERKYRAS
HR 127 bpm
I
II
III
AUR
AUL
AUF
U1
U2
U3
U4
U5
U6
II
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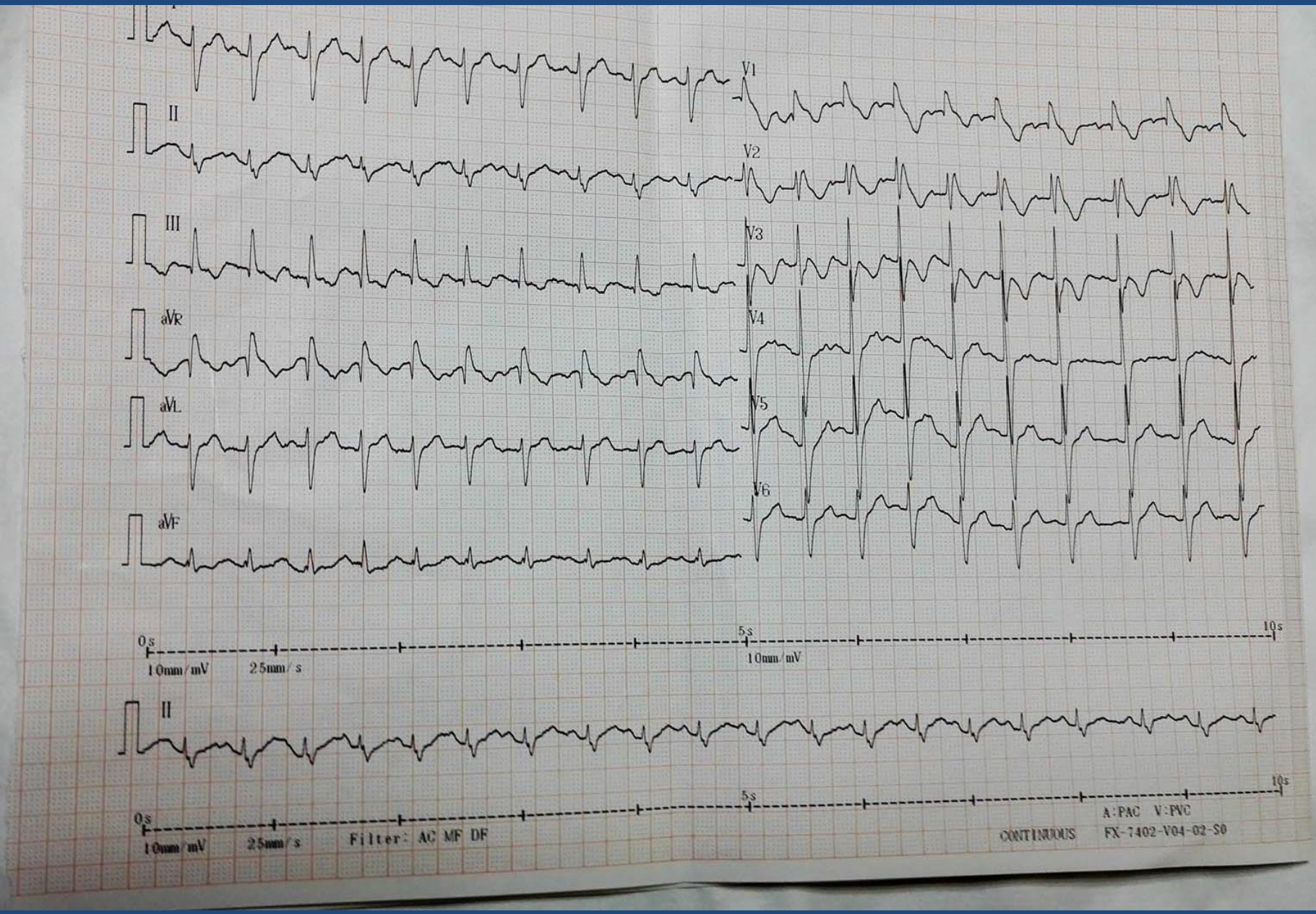

I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
0s
5s
10s
10mm/mV
25mm/s
10mm/mV
II
0s
5s
10s
10mm/mV
25mm/s
Filter: AC MF DF
A:PAC V:PVC
CONTINUOUS
FX-7402-V04-02-S0

# ΠΑΡΟΥΣΙΑΣΗ ΠΕΡΙΣΤΑΤΙΚΟΥ

- ✓ Μετά την αποκατάσταση του SR χορήγηση αμιωδαρόνης 5 mg/kgr
- ✓ Διακομιδή σε παιδιατρικό νοσοκομείο
- ✓ Θετική CTNI την πρώτη ημέρα (μετά αρνητικές τιμές)
- ✓ Nonsustained VT

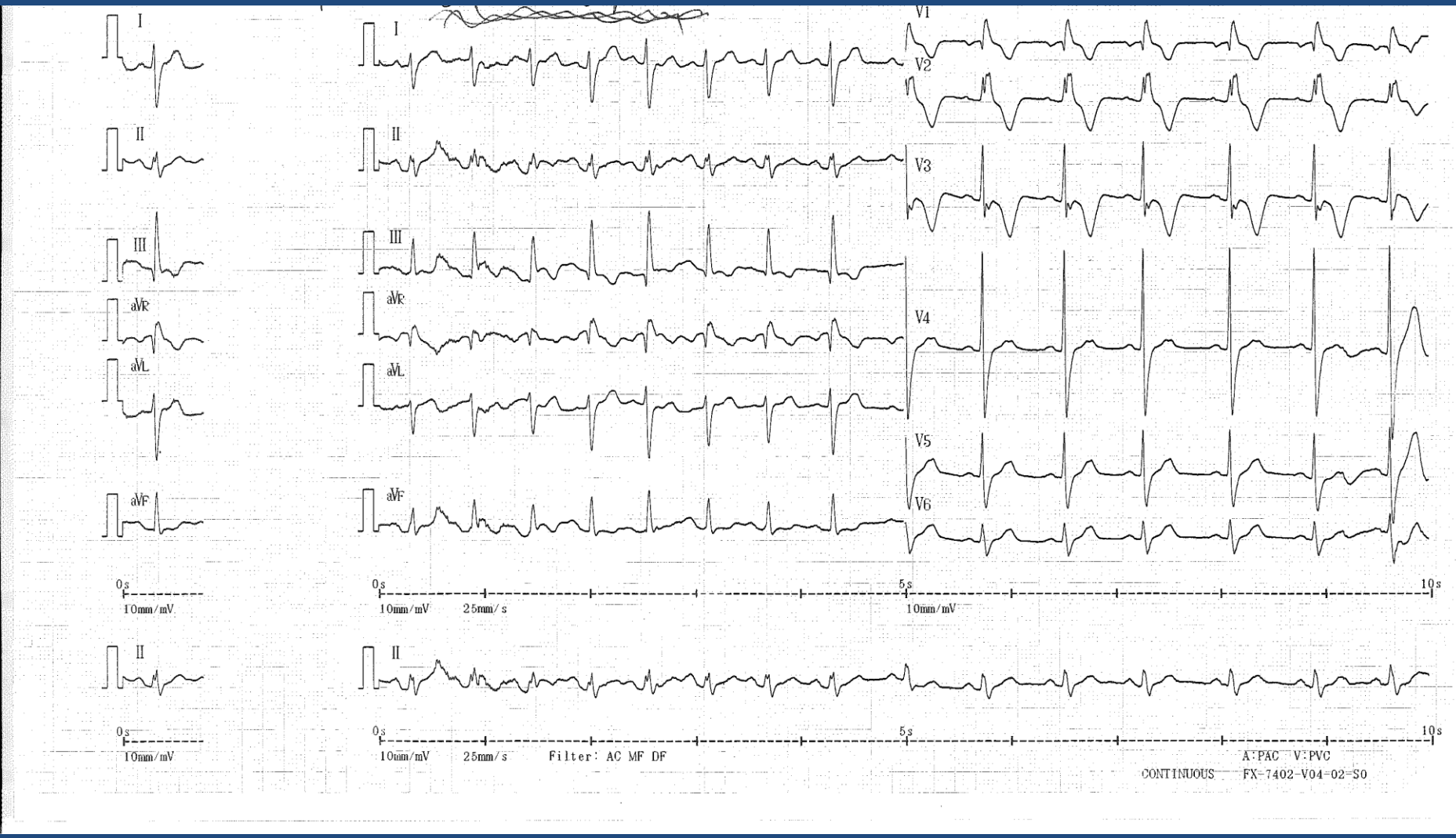
# MRI καρδιάς

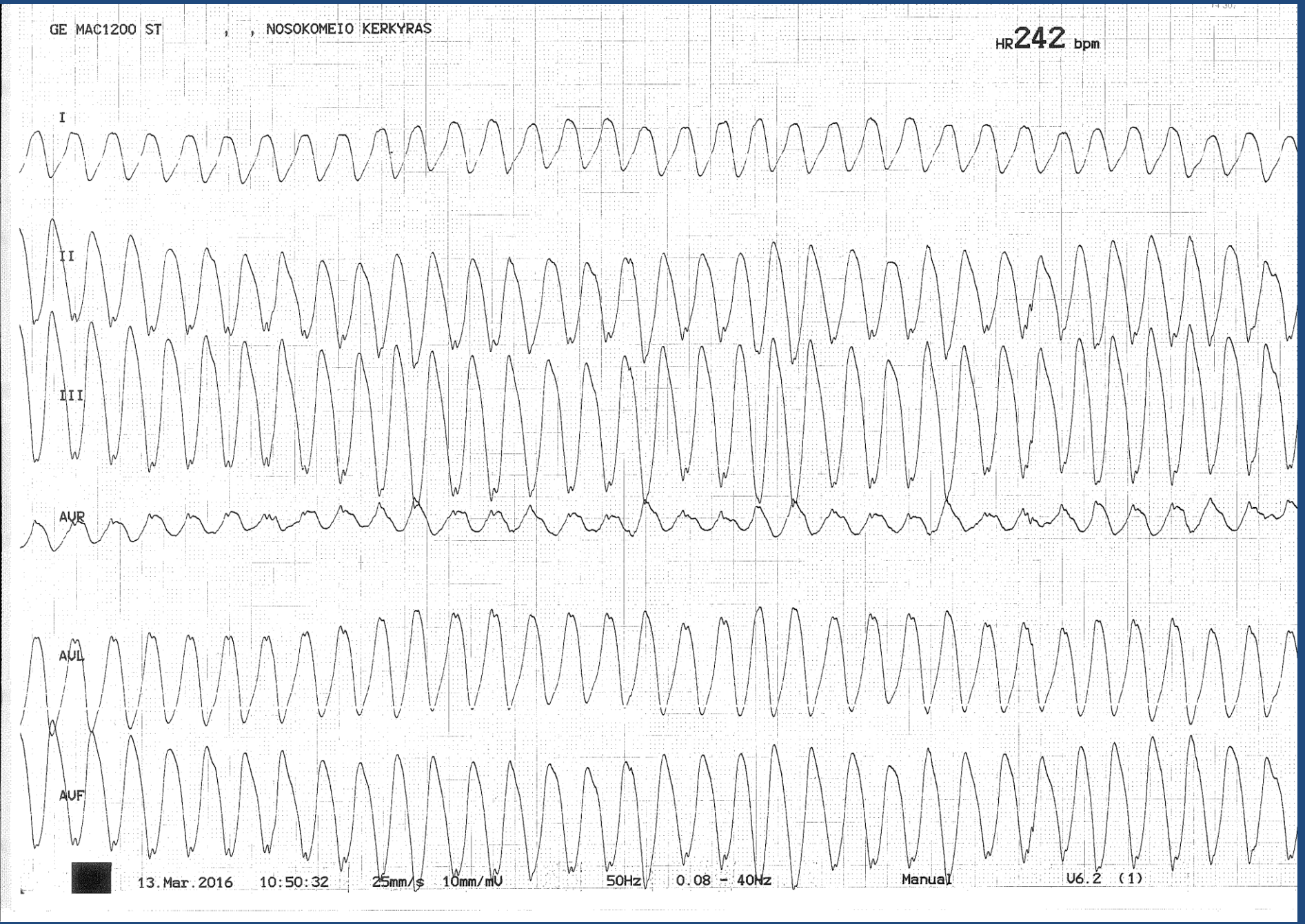
Στις T2 inversion recovery ακολουθίες αναγνωρίζεται ανομοιογένεια του

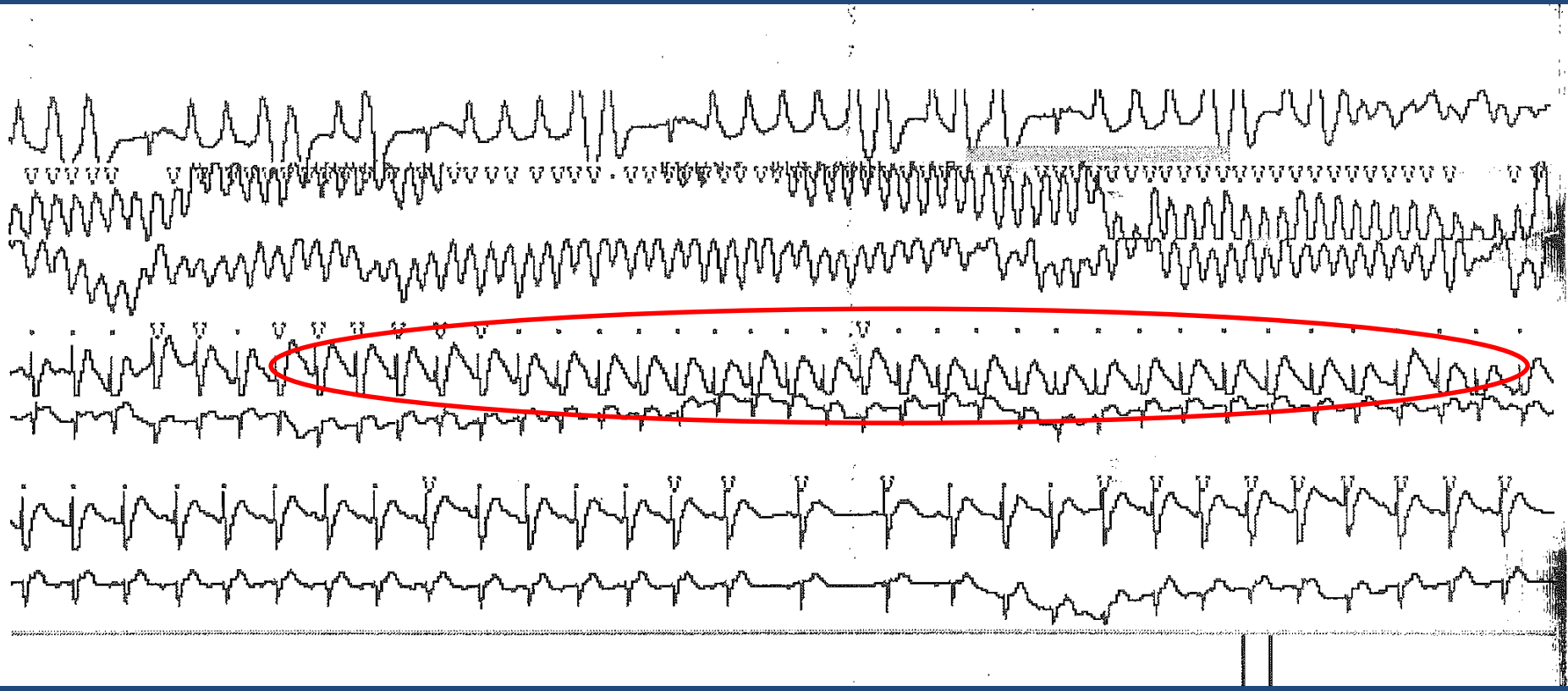
**ΣΥΜΠΕΡΑΣΜΑ**:
Φυσιολογικές οι λειτουργικές παράμετροι αμφοτέρων των κοιλιών. Ανομοιογένεια στην απεικόνιση του μυοκαρδιακού τοιχώματος της αριστεράς κοιλίας ως επί παρουσίας αλλοιώσεων οξείας φλεγμονώδους αντίδρασης (αλλοιώσεις που θα μπορούσαν να σχετίζονται με υποκείμενη οξεία μυοκαρδίτιδα). Εντοπίζονται κατά κύριο λόγο στο πλάγιο και κατώτερο τοίχωμα.

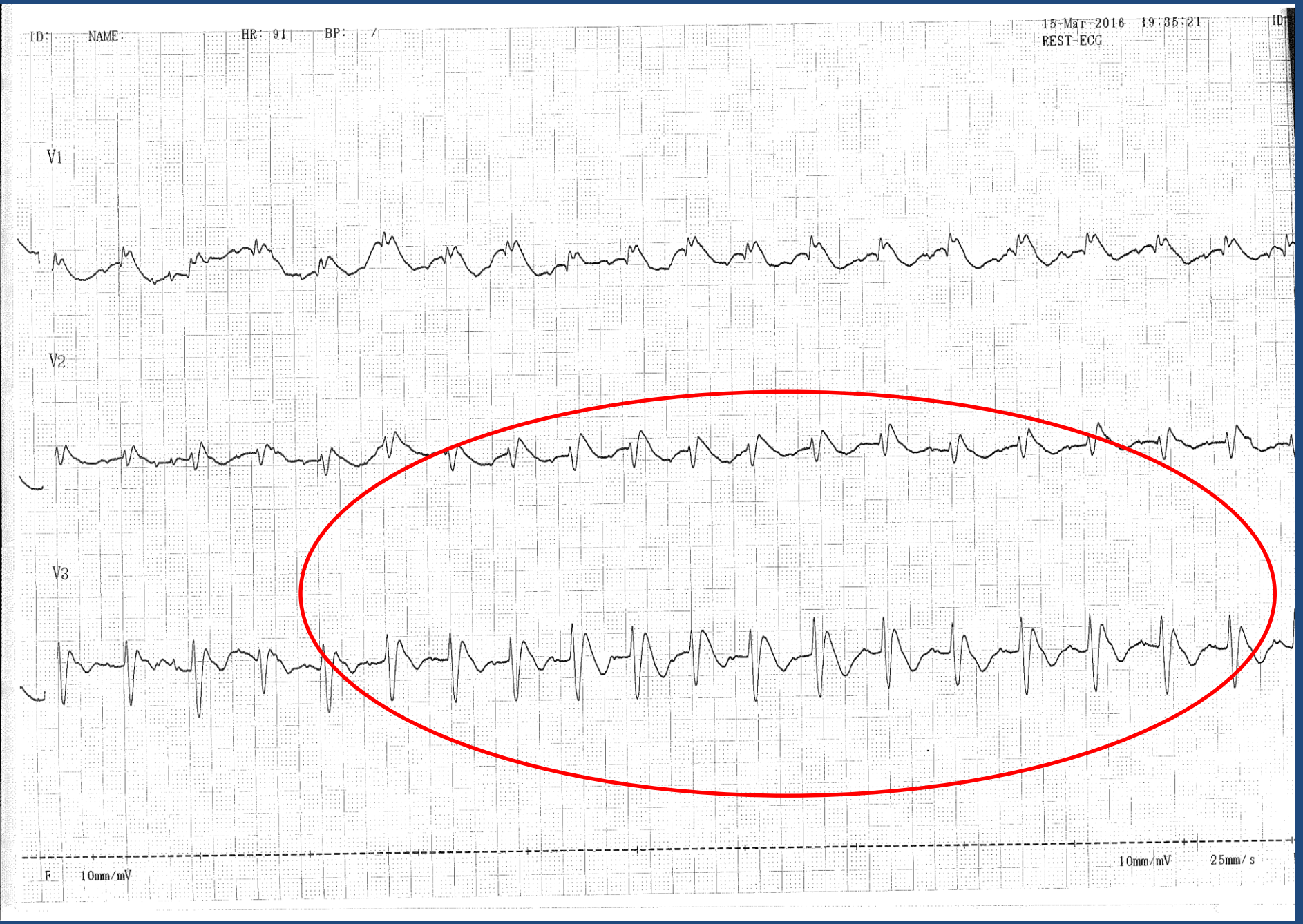
παρουσία επικαρδιακών περιοχών προσλήψης του σκιαγραφικού στο πλάγιο τοίχωμα της κοιλότητος, σε έκταση μικρότερη απο αυτή των περιοχών οιδήματος Πλέον σταθερή και εκτεταμένη είναι περιοχή ενδο και επικαρδιακή, σε έκταση 17 χιλ., η οποία βρίσκεται στη θεση της μεσότητος και κατώτερου τοιχώματος της κοιλίας (τμήμα 10).

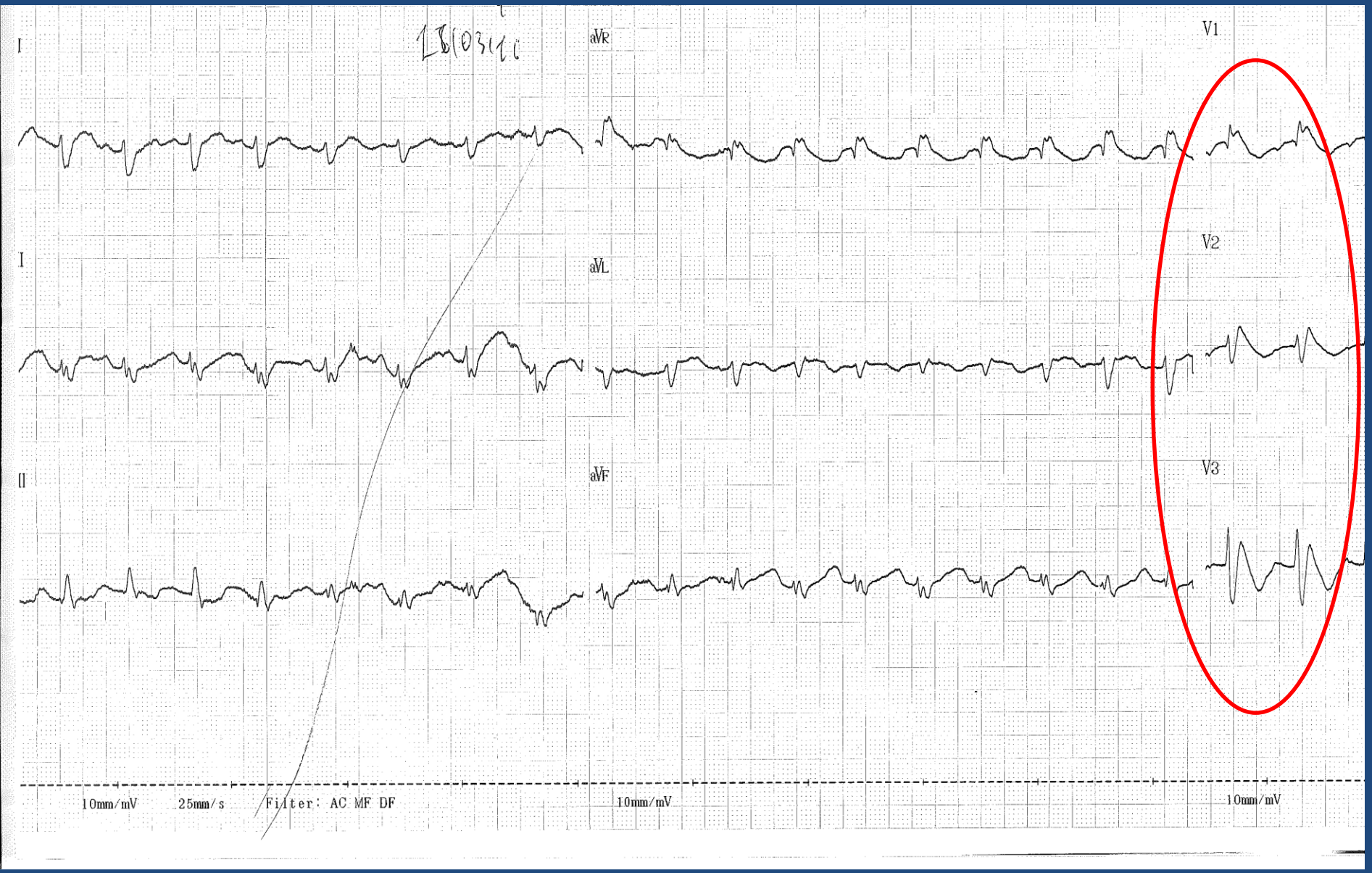
Έξοδος με αμιωδαρόνη


I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
0s
10mm/mV
5s
10s
25mm/s
Filter: AC MF DF
A:PAC V:PVC
CONTINUOUS FX-7402-V04-02-S0


GE MAC1200 ST , , NOSOKOMEIO KERKYRAS
HR242 bpm
I
II
III
AUR
AUL
AUF
13.Mar.2016 10:50:32 25mm/s 10mm/mV 50Hz 0.08 - 40Hz Manual V6.2 (1)




ID: NAME: HR: 91 BP: /
15-Mar-2016 19:35:21
REST-ECG
V1
V2
V3
F 10mm/mV
10mm/mV 25mm/s


I
aVR
V1
I
aVL
V2
II
aVF
V3
10mm/mV
25mm/s
Filter: AC MF DF
10mm/mV
10mm/mV

# ΔΙΑΓΝΩΣΗ

- Brugada syndrome
- Μυοκαρδίτιδα
- Προαρρυθμική δράση

# RBBB & BS

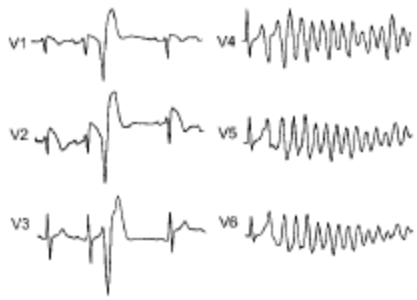



**Figure 1.** Typical electrocardiographic characteristics of Brugada syndrome include an accentuated J wave appearing principally in the right precordial leads (V1 to V3) and taking the form of an ST-segment elevation, often followed by a negative T wave, very closely coupled extrasystoles, and a rapid polymorphic VT. Modified with permission from Vanzini P, Brugada J. Spontaneous recurrent ventricular fibrillation in a patient with a structurally normal heart. *Pacing Clin Electrophysiol*. 2000;23:266–267,[20] by permission of Blackwell Publishing, Futura Division ©2000.

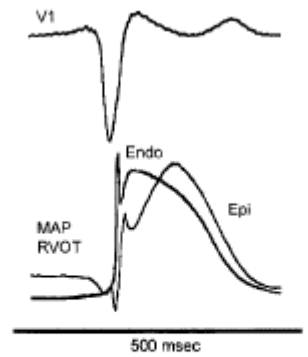



**Figure 2.** Monophasic action potential (MAP) recordings from endocardium (Endo) and epicardium (Epi) of the RV outflow tract (RVOT) of a patient with Brugada syndrome. Prominent action potential notch is apparent in epicardial MAP, but not in endocardial MAP, coincident with appearance of the accentuated J wave or ST-segment elevation in the ECG (V1).

Antzelevitch Circ Res 2002;1114-1118

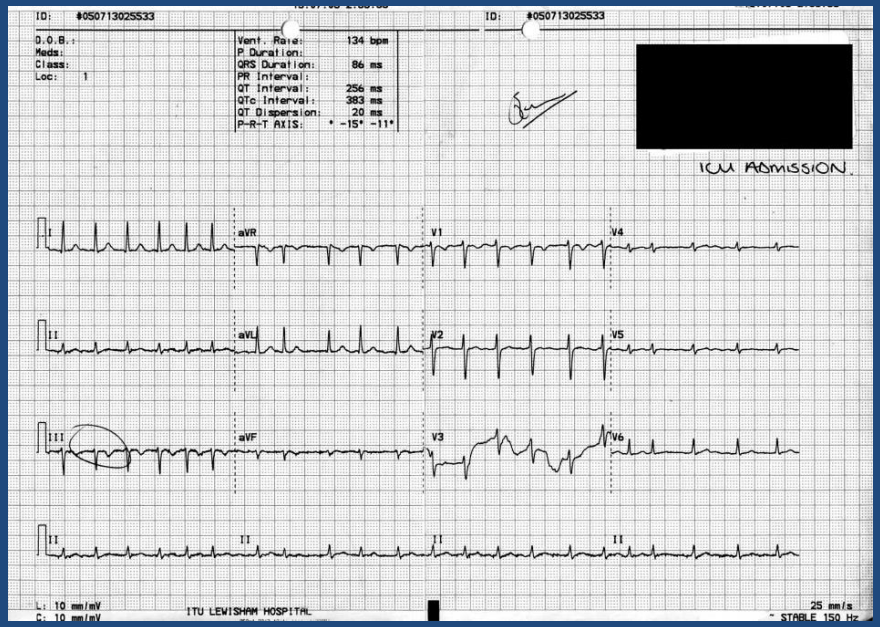
# Αμιωδαρόνη και BS

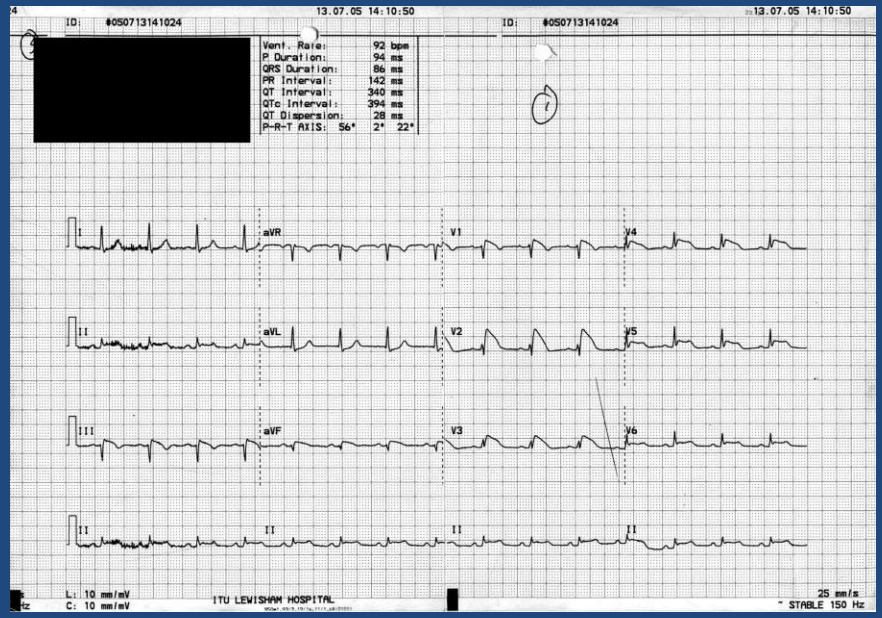
- Αμιωδαρόνη αναστολέας διαύλων ιόντων $K^+$
- Στην οξεία φάση αναστολέας διαύλων ιόντων $Na^+$

Sheldon RS et al. Amiodarone: biochemical evidence for binding to a receptor for class I drugs associated with the rat cardiac sodium channel. Circ Res. 1989;65:477–482. 2.

Lalevee N et al. Effects of amiodarone and dronedarone on voltage-dependent sodium current in human cardiomyocytes. J Cardiovasc Electrophysiol. 2003;14:885– 890. $^+$

# Αμιωδαρόνη και BS




Paul et al. Circulation 2006;91:1114-1118

*Case Report*

# Torsade de Pointes and Persistent QTc Prolongation after Intravenous Amiodarone

**Anna P. Kotsia,[1] Georgios Dimitriadis,[2] Giannis G. Baltogiannis,[1] and Theofilos M. Kolettis[1]**

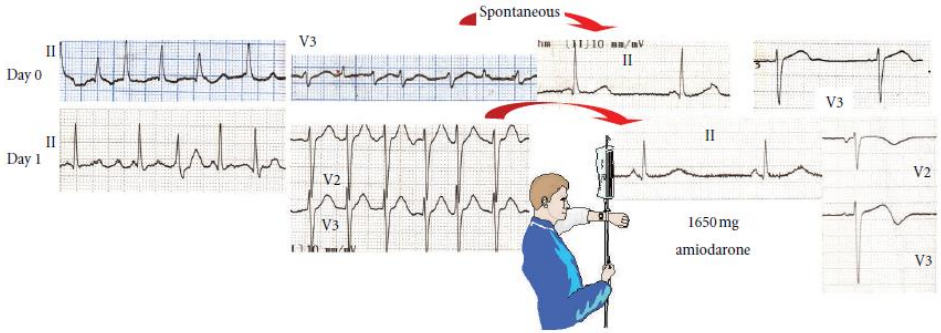



FIGURE 1: Baseline QTc. QTc interval was normal prior to amiodarone administration (day 0); after 1.65g intravenous amiodarone, QTc increased progressively.

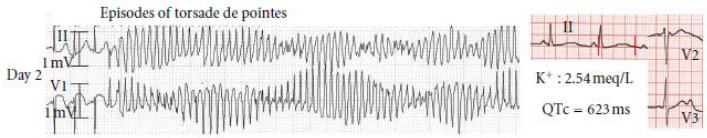



FIGURE 2: Torsade de pointes after amiodarone administration.

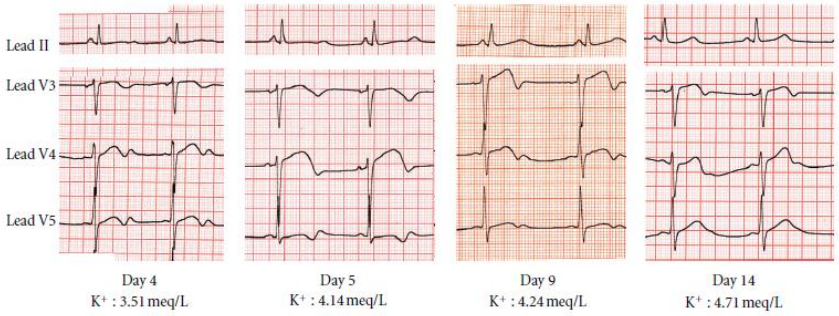



FIGURE 3: Time course of QTc prolongation. QTc prolongation persisted for 14 days after cessation of intravenous amiodarone. Note the (marginally) low serum $K^+$ on the 4th hospital day.

Kotsia et al. Case Rep Med 2012;2012:673019

# ΑΝΤΙΜΕΤΩΠΙΣΗ

- Επανάληψη MRI
- Αντιαρρυθμικά
- ICD

# Drug-Induced Brugada Syndrome in Children

## Clinical Features, Device-Based Management, and Long-Term Follow-Up

Giulio Conte, MD,* Wendy Dewals, MD,† Juan Sieira, MD,* Carlo de Asmundis, MD,* Giuseppe Ciconte, MD,* Gian-Battista Chierchia, MD,* Giacomo Di Giovanni, MD,* Giannis Baltogiannis, MD,* Yukio Saitoh, MD,* Moises Levinstein, MD,* Mark La Meir, MD,‡ Francis Wellens, MD,‡ Gudrun Pappaert, RN,* Pedro Brugada, MD*

*Brussels, Belgium*

**Table 1** Clinical Characteristics and ECG Parameters of Group I (≤12 Years of Age) and Group II (>12 Years of Age)

| | Group I (n = 40) | Group II (n = 465) | p Value |
|---|---|---|---|
| Clinical characteristics | | | |
| Male | 24 (60) | 271 (58) | 0.87 |
| Family history of SCD | 24 (60) | 218 (47) | 0.13 |
| Clinical presentation | | | |
| Asymptomatic | 30 (75) | 236 (51) | 0.003 |
| Syncope | 8 (20) | 123 (26) | 0.37 |
| Aborted SCD | 2 (5) | 16 (3.4) | 0.61 |
| History of atrial arrhythmias | 3 (7.5) | 33 (7) | 0.92 |
| Documented SND | 3 (7.5) | 7 (1.5) | 0.04 |
| ECG baseline parameters | | | |
| PR interval, ms | 140 ± 28 | 173 ± 32 | <0.001 |
| QRS duration, ms | 92 ± 15 | 98 ± 20 | 0.06 |
| QTc interval, ms | 404 ± 37 | 409 ± 26 | 0.37 |
| Maximal ST-segment elevation, mm | 0.52 ± 0.25 | 0.58 ± 0.18 | 0.73 |
| Brugada type II ECG | 3 (7.5) | 63 (13.5) | 0.27 |
| Incomplete RBBB | 1 (2.5) | 23 (5) | 0.48 |
| First-degree AV block | 1 (2.5) | 62 (13) | 0.05 |

**Table 3** Long-Term Follow-Up of Children With Brugada Syndrome

| | |
|---|---|
| SCD | 0 |
| Syncope | 2 (5%) |
| Documented life-threatening arrhythmias | 1 (2%)* |
| Newly diagnosed AF | 1 (2%) |
| Appropriate ICD interventions | 1 (8%)* |
| Inappropriate ICD interventions | 4 (33%) |
| Device-related complications | 4 (33%) |
| Pulmonary vein isolation | 1 (8%) |

Values are n or n (%). *Same patient.
ICD = implantable-cardioverter defibrillator; other abbreviations as in Table 1.

Conte et al. 2014;63:2272-9

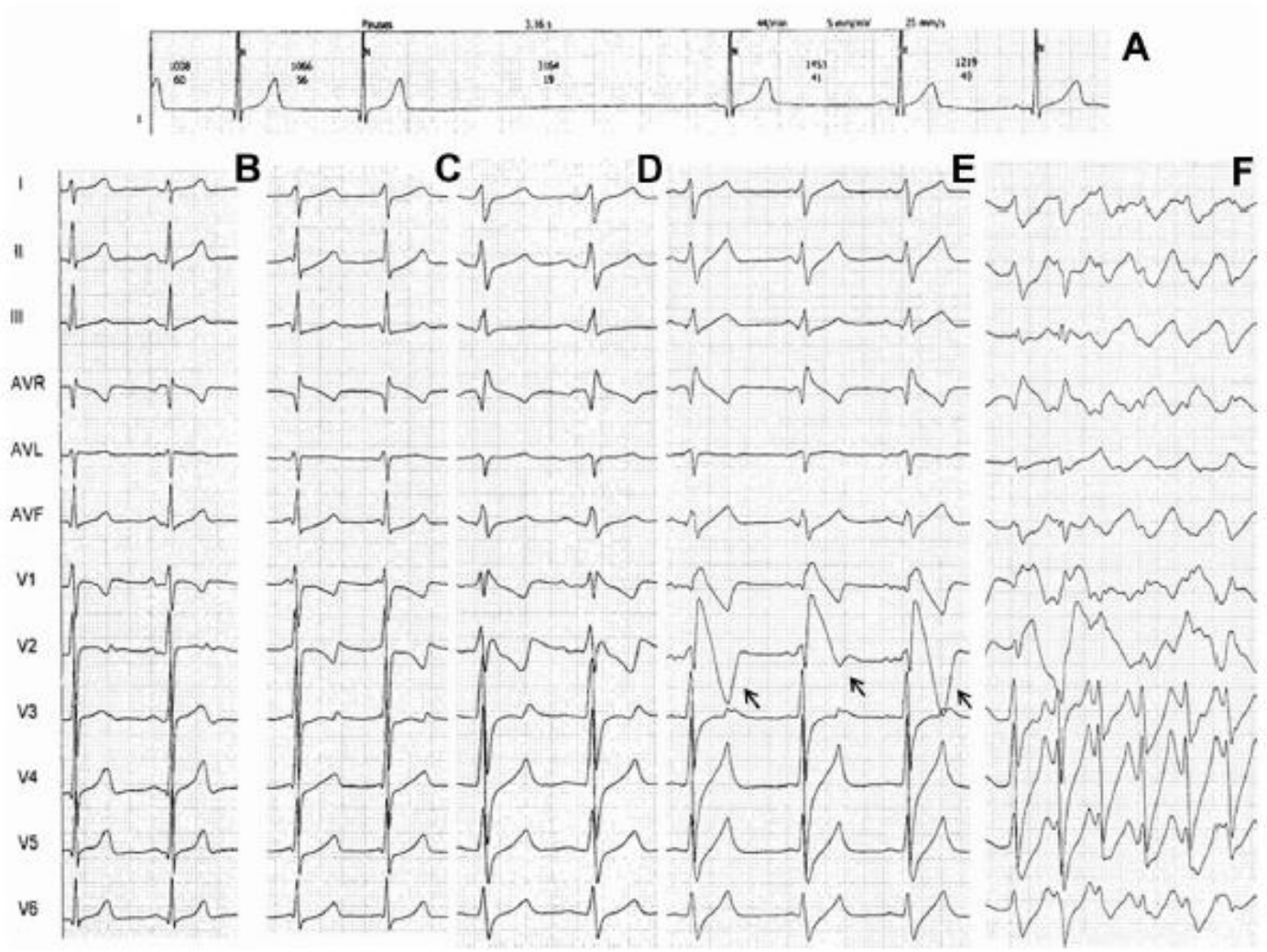



**Figure 1** **Episode of Sustained Polymorphic VT During Ajmaline Challenge in a 7-Year-Old Boy Presenting With Syncope and Signs of SND**

**(A)** Holter monitoring showing sinus pause. **(B)** Baseline electrocardiogram (ECG). **(C)** ECG during ajmaline challenge (dose of 0.7 mg/kg). **(D)** Appearance of Brugada type 1 ECG at an ajmaline dose of 1 mg/kg. **(E)** ECG 1 min after ajmaline challenge. T-wave alternans can be seen in $V_1$ and $V_2$ leads **(arrows)**. **(F)** Episode of polymorphic ventricular tachycardia (VT) 2 min after ajmaline challenge. SND = sinus node dysfunction.

# Implantable Cardioverter-Defibrillator Therapy in Brugada Syndrome

## A 20-Year Single-Center Experience

Giulio Conte, MD,* Juan Sieira, MD,* Giuseppe Ciconte, MD,* Carlo de Asmundis, MD,* Gian-Battista Chierchia, MD,* Giannis Baltogiannis, MD,* Giacomo Di Giovanni, MD,* Mark La Meir, MD,† Francis Wellens, MD,† Jens Czapla, MD,† Kristel Wauters, MD,* Moises Levinstein, MD,* Yukio Saitoh, MD,* Ghazala Irfan, MD,* Justo Julià, MD,* Gudrun Pappaert, RN,* Pedro Brugada, MD*

**TABLE 1** Baseline Clinical and Procedural Characteristics of the Study Population According to Year of Implantation

| | Overall (n = 176) | Group I (n = 82) | Group II (n = 94) | p Value |
|---|---|---|---|---|
| Age, yrs | 43.3 ± 16.8 | 42.5 ± 15.3 | 44.0 ± 18.2 | 0.46 |
| Male | 118 (67.0) | 62 (75.6) | 56 (59.6) | 0.02 |
| Spontaneous type 1 ECG pattern | 37 (21.0) | 28 (34.1) | 9 (9.6) | <0.01 |
| Aborted SCD | 25 (14.2) | 15 (18.3) | 10 (10.6) | 0.15 |
| Syncope | 105 (59.7) | 39 (47.6) | 66 (70.2) | <0.01 |
| Asymptomatic | 46 (26.1) | 28 (34.1) | 18 (19.1) | 0.01 |
| Family history of SCD | 90 (51.1) | 47 (57.3) | 43 (45.7) | 0.13 |
| Previous atrial arrhythmias | 24 (13.6) | 14 (17.1) | 10 (10.6) | 0.22 |
| Previous SND | 9 (5.1) | 6 (7.3) | 3 (3.2) | 0.31 |
| Inducible on EPS* | 72 (43.6) | 58 (75.3) | 14 (15.9) | <0.01 |
| *SCN5A* mutation* | 23 (21.9) | 13 (21.7) | 10 (22.2) | 0.95 |
| Abdominal implantation | 19 (10.8) | 6 (7.3) | 13 (13.8) | 0.19 |
| Epicardial lead placement | 8 (4.5) | 3 (3.7) | 5 (5.3) | 0.73 |

Values are mean ± SD or n (%). Group I included patients who underwent ICD placement before 2005, and group II included patients who underwent ICD placement during or after 2005. *Percents refer to patients who underwent EPS and genetic testing.

ECG = electrocardiographic; EPS = electrophysiologic study; ICD = implantable cardioverter-defibrillator; SCD = sudden cardiac death; SND = sinus node dysfunction.

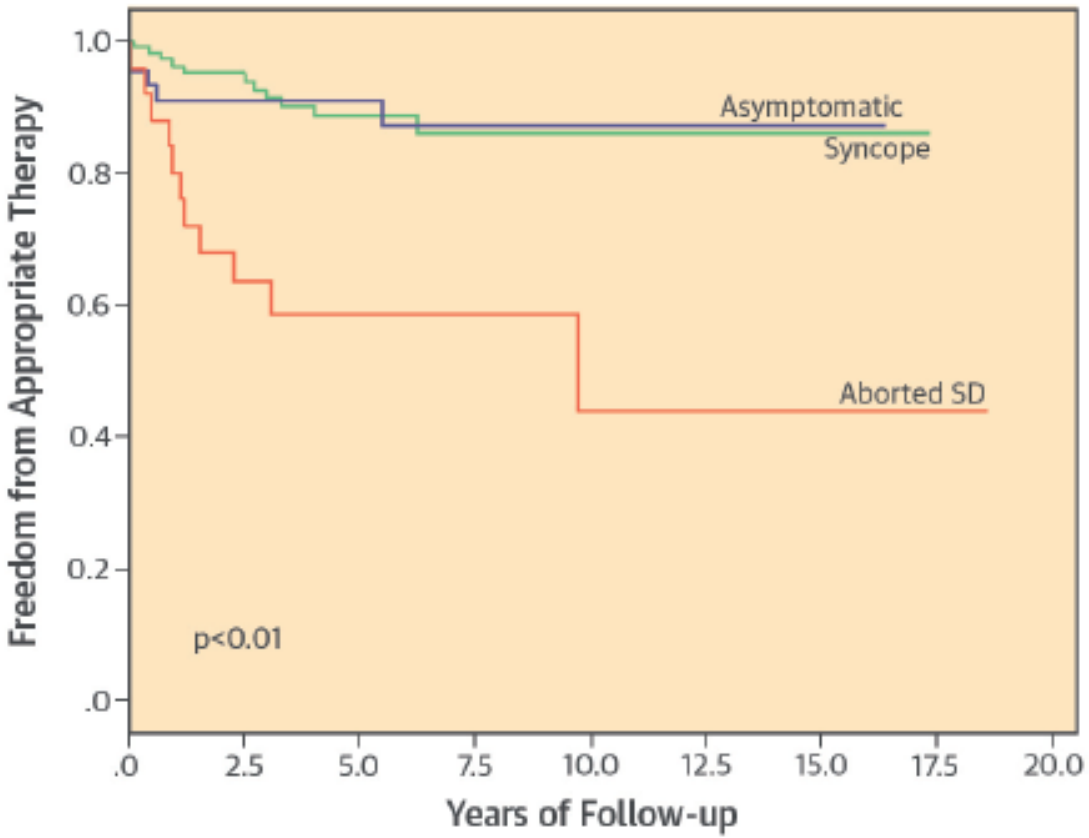
Conte et al. JACC 2015;65:879-88

**TABLE 2** Clinical Characteristics and Outcomes of Patients According to ICD Indication

| | Overall (n = 176) | Aborted SCD (n = 25) | Syncope (n = 105) | Asymptomatic (n = 46) | p Value |
|---|---|---|---|---|---|
| Clinical features | | | | | |
| Age, yrs | 43.3 ± 16.8 | 39.5 ± 15.6 | 43.2 ± 17.2 | 45.3 ± 16.6 | 0.41 |
| Male | 118 (67.0) | 16 (64.0) | 66 (62.9) | 36 (78.3) | 0.17 |
| Proband | 92 (52.3) | 16 (64.0) | 57 (54.3) | 19 (41.3) | 0.15 |
| Spontaneous type 1 ECG pattern | 37 (21.0) | 7 (28.0) | 19 (18.1) | 11 (23.9) | 0.47 |
| Family history of SCD | 90 (51.1) | 10 (40.0) | 53 (50.5) | 27 (58.7) | 0.32 |
| Previous atrial arrhythmias | 24 (13.6) | 3 (12.0) | 14 (13.3) | 7 (15.2) | 0.92 |
| Previous SND | 9 (5.1) | 1 (4.0) | 5 (4.8) | 3 (6.5) | 0.87 |
| Inducible on EPS* | 72 (43.6) | 5 (26.3) | 39 (37.9) | 28 (65.1) | <0.01 |
| *SCN5A* mutations* | 23 (21.9) | 6 (26.1) | 9 (15.8) | 8 (32) | 0.23 |
| Outcomes | | | | | |
| Appropriate shocks | 28 (15.9) | 11 (44.0) | 11 (10.5) | 6 (13.0) | <0.01 |
| Time to first therapy, months | 20.7 ± 25.9 | 23.6 ± 32.5 | 19.9 ± 18.5 | 15.7 ± 28.3 | 0.85 |
| Shock rate per year | 0.46 ± 1.05 | 0.23 ± 0.28 | 0.8 ± 1.56 | 0.16 ± 0.11 | 0.38 |
| Inappropriate shocks | 33 (18.8) | 8 (32.0) | 18 (17.1) | 7 (15.2) | 0.54 |
| Time to first therapy (months) | 49.9 ± 46.2 | 53.9 ± 47.6 | 54.8 ± 50.4 | 34.2 ± 36.8 | 0.66 |
| Shock rate per year | 0.47 ± 1.26 | 0.19 ± 0.19 | 0.64 ± 1.59 | 0.17 ± 0.05 | 0.71 |
| Deaths | 8 (4.5) | 3 (12.0) | 5 (4.8) | 0 (0) | 0.10 |

Values are mean ± SD or n (%). *Percents refer to patients who underwent EPS and genetic testing.
Abbreviations as in Table 1.

## CENTRAL ILLUSTRATION ICD Therapy in Brugada Syndrome




| Number at Risk | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Asymptomatic | 46 | 32 | 26 | 17 | 10 | 3 | 1 | |
| Syncope | 105 | 77 | 46 | 27 | 16 | 6 | 3 | |
| Aborted SD | 25 | 13 | 8 | 5 | 3 | 2 | 2 | 1 |

Conte, G. et al. J Am Coll Cardiol. 2015; 65(9):879–88.

Kaplan-Meier curve analyzing freedom from appropriate shocks according to implantable cardioverter-defibrillator (ICD) indication. SD = sudden cardiac death.

**TABLE 3** Univariate Cox Regression Analysis Among Patients Experiencing Appropriate Shocks

| | β Coefficient | HR (95% CI) | p Value |
|---|---|---|---|
| Age | −0.02 | 0.98 (0.96–1.0) | 0.12 |
| Male | 1.08 | 2.95 (1.02–8.53) | 0.04 |
| Proband | −0.35 | 0.71 (0.33–1.53) | 0.38 |
| Spontaneous type 1 ECG pattern | 0.91 | 2.50 (1.16–5.39) | 0.02 |
| Symptoms | 0.97 | 2.63 (1.40–4.92) | <0.01 |
| Syncope | −0.08 | 0.93 (0.32–2.67) | 0.89 |
| Aborted SCD | 1.51 | 4.53 (1.57–13.0) | <0.01 |
| Family history of SCD | −0.42 | 0.66 (0.31–1.42) | 0.29 |
| Previous AF | −0.31 | 0.73 (0.22–2.44) | 0.61 |
| Previous SND | 0.57 | 1.77 (0.42–7.50) | 0.44 |
| EPS inducibility | 0.90 | 2.44 (1.18–6.02) | 0.04 |
| *SCN5A* mutation | 0.29 | 1.33 (0.24–7.45) | 0.74 |
| Implantation during or after 2005 | −1.18 | 0.31 (0.12–0.77) | 0.01 |

The HR for age considers every year increase.

AF = atrial fibrillation; CI = confidence interval; HR = hazard ratio; other abbreviations as in Table 1.

**FIGURE 1** Baseline Electrocardiograms of Patients With Electrical Storm

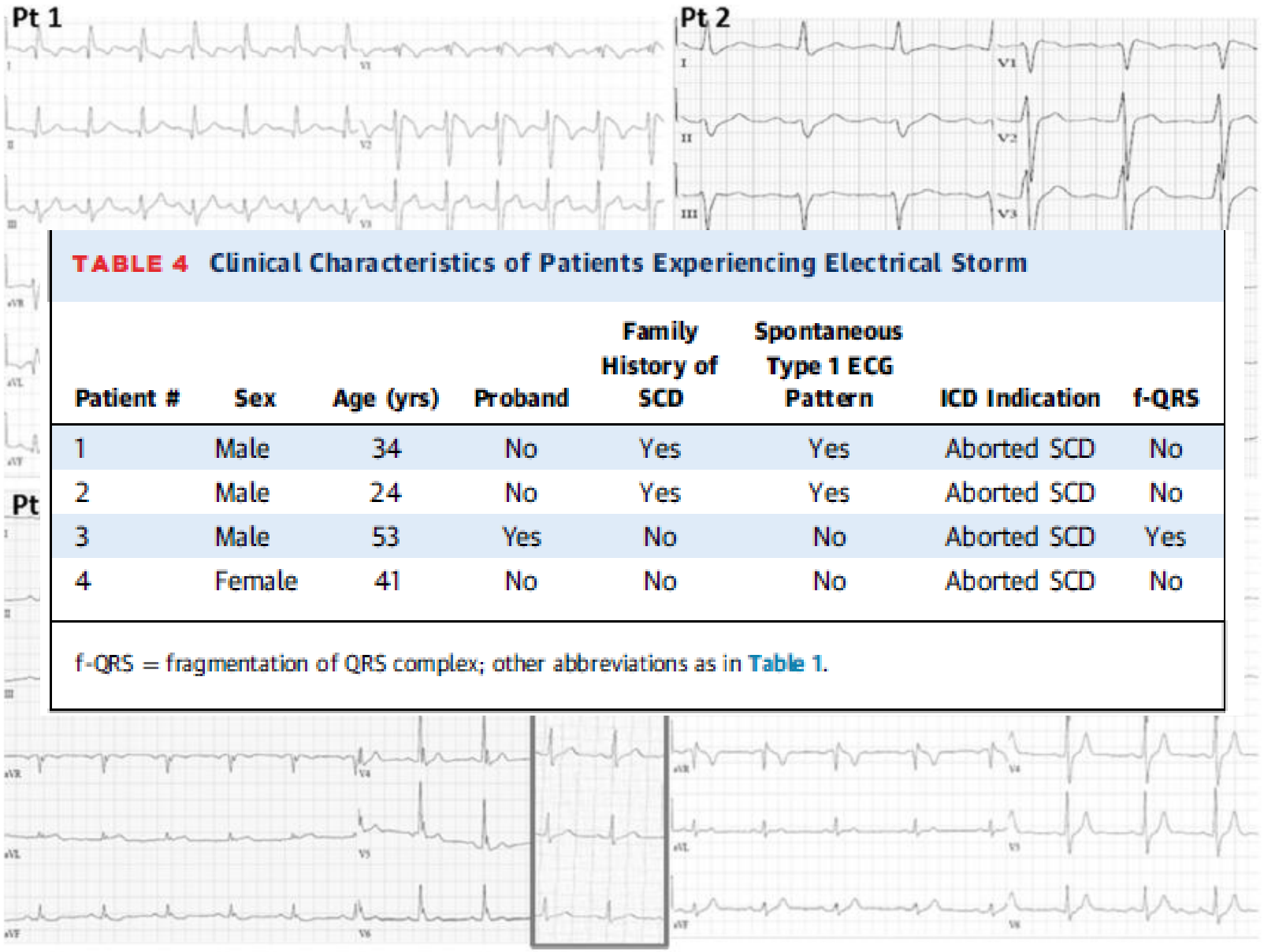



**TABLE 4** Clinical Characteristics of Patients Experiencing Electrical Storm

| Patient # | Sex | Age (yrs) | Proband | Family History of SCD | Spontaneous Type 1 ECG Pattern | ICD Indication | f-QRS |
|---|---|---|---|---|---|---|---|
| 1 | Male | 34 | No | Yes | Yes | Aborted SCD | No |
| 2 | Male | 24 | No | Yes | Yes | Aborted SCD | No |
| 3 | Male | 53 | Yes | No | No | Aborted SCD | Yes |
| 4 | Female | 41 | No | No | No | Aborted SCD | No |

f-QRS = fragmentation of QRS complex; other abbreviations as in Table 1.

Fragmentation of the terminal portion of the QRS complex can be appreciated in all leads of the baseline electrocardiogram of Patient #3. *Electrocardiogram after ajmaline challenge. Pt = patient.

# Προγνωστικοί ΗΚΓ δείκτες-BS

- Κατακερματισμός του QRS
- Βαθύ S στην απαγωγή I
- AF
- SND

# BS

- Μετάπτωση του ΗΚΓ από τύπου Ι σε ΙΙ
- Δεν είναι γνωστός ακριβώς ο επιπολασμός του συνδρόμου
- Φάρμακα (brugadadrugs.org)

# Αντιαρρυθμικά με πιθανό όφελος

- Ισοπροτερενόλη
- Κινιδίνη