

# Einthoven lecture

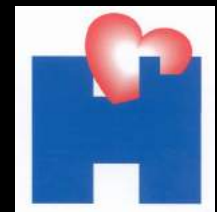
## Electrophysiology in a humanitarian context

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EHRA 2019 – Lisbon - Portugal



Marc Zimmermann, MD  
Cardiovascular Department  
Hôpital de La Tour  
Meyrin - Geneva - Switzerland



« Cœur de la Tour »  
Foundation

# aims

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« humanitarian » or development assistance ?

1. Teaching professionals on site
2. Shortening of the learning curve
3. Giving advices on organization
4. Giving technical advices and technical assistance
5. Adaptation to the local context
6. Optimal use of local resources
7. Reducing waste
8. Decreasing the gap between two worlds
9. Offering adequate treatment for everybody

# aims

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Help us ....  
...but...

- No medical tourism
- Projects should be monitored and controlled
- Long-term projects
- Projects based on education

*Statement made by an Egyptian surgeon during the  
International Cooperation Committee EACTS (Vienne 2003)*

# Teaching electrophysiology

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Teaching ECG...

Teaching guidelines

Teaching technical skills

on site live procedures or courses

on-line support and teaching

participation to local congresses

promoting clinical research

ECG **teaching course** at the “Hôpital central” of Yaoundé (Cameroon)



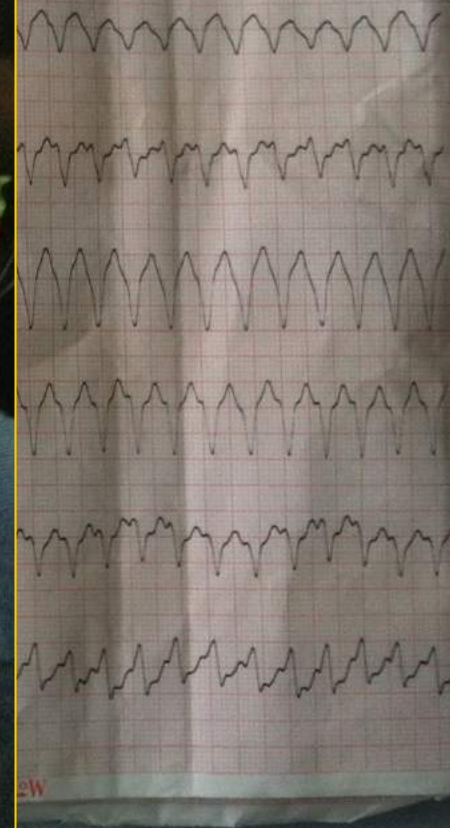
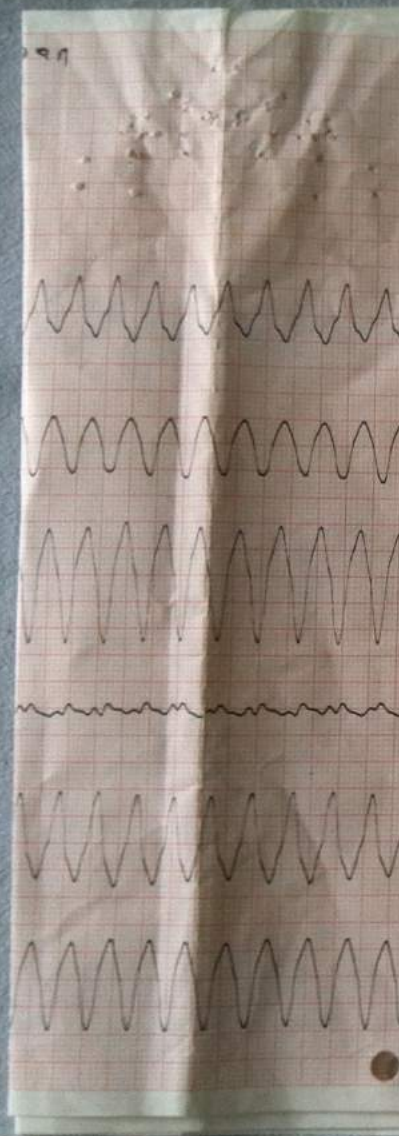
To medical students  
To nurses....

To cardiologists  
To electrophysiologists....



+ **teaching through the internet**

Teaching on site  
emergency room  
Dharan - Nepal



# Teaching on site - Cathlab Open Heart Clinic – Tbilisi - Georgia





# ATRIAL FIBRILLATION IN AFRICA: clinical characteristics, prognosis and adherence to guidelines in Cameroon

M. Ntep-Gweth, MD<sup>#</sup>, M. Zimmermann, MD\*, A. Meiltz, MD\*, S. Kingue, MD<sup>#</sup>, P. Ndobu\*, P. Urban\*, A. Bloch\*, Hôpital de La Tour - Meyrin\* and Hôpital Central de Yaoundé - Cameroon<sup>#</sup>

## Introduction

Atrial fibrillation (AF) is the most common sustained arrhythmia and guidelines concerning treatment have been published by ACC/AHA/ESC. Only few studies have been devoted to application of these guidelines in clinical practice and no data are available concerning treatment of AF in Africa.

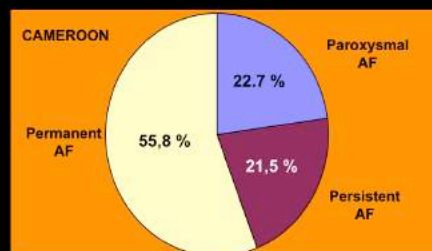
## Objectives

The aim of the present study was to characterize the clinical profile of patients with AF in the urban population of a sub-Saharan African country and to assess how successfully current guidelines are applied in this context.

## Methods

- Prospective survey
- 10 cardiologists in Cameroon
- From June 2006 to July 2007
- Data on clinical profile, mode of presentation and therapeutic strategy were collected and analyzed
- Inclusion criteria: AF documented by an ECG during the index visit and age > 18 yrs

## AF classification



## Patients characteristics (n = 172)

Mean age (yrs)	65.8 ± 13
M/F	75/97
Structural Heart Disease	156/172 (90.7%)
hypertensive heart disease	82/172 (47.7%)
Rheumatic heart disease	44/172 (25.6%)
Congestive HF	85/172 (49.4%)
Previous Cerebrovascular accident	30/172 (17.4%)

## Treatment strategy



## CHADS<sub>2</sub> score

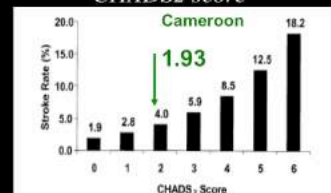
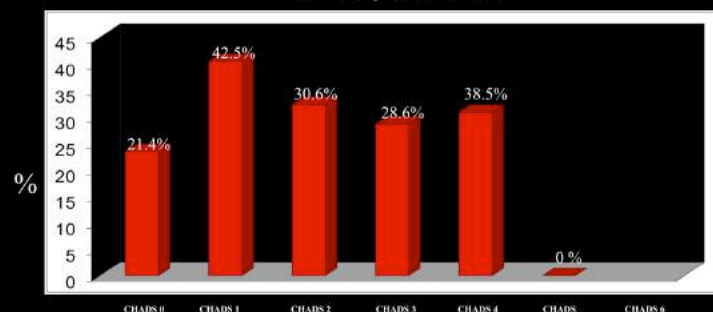


Figure 2. Relationship between the CHADS<sub>2</sub> score and the risk of stroke  
Gage FG, JAMA 2001; 286: 2864-70

## Anticoagulation rate

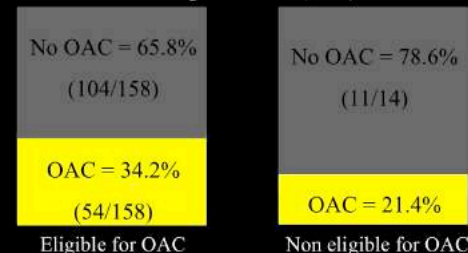


## Echocardiography data

n = 172

Echo performed	141/172 (82.0%)
LA diameter (mm)	50 ± 10
Normal LV function	44 /141 (31.2%)
Discrete LV dysfunction	40/141 (28.4%)
Moderate LV dysfunction	32/141(22.7%)
Severe LV dysfunction	25/141 (17.7%)

## Anticoagulation rate (OAC)



## follow-up data (FU duration 318 ± 124 days)

Death	26/88 (29.5%)
Cardiovascular death	15/26
Non lethal embolic stroke	11/88 (12.5%)
Congestive heart failure	23/88 (26.1%)

## Conclusion

- Clinical presentation of AF is much more severe in Cameroon than in developed countries
- A rate-control strategy is almost the rule in Cameroon and OAC is prescribed in only 34.2% of eligible patients despite a high CHADS<sub>2</sub> score at inclusion
- Death and stroke rate at one year are very high in Cameroon possibly because of a lower use of OAC, a higher prevalence of rheumatic mitral disease and of more severe comorbidities





## Atrial fibrillation in Africa: clinical characteristics, prognosis, and adherence to guidelines in Cameroon

Marie Ntep-Gweth, Marc Zimmermann\*, Alexandre Meiltz, Samuel Kingue, Pierre Ndobu, Philipp Urban, and Antoine Bloch

Department of Cardiology, Hôpital De La Tour, 1, Avenue J.-D. Maillard, Meyrin, Geneva 1217, Switzerland

Received 7 September 2009; accepted after revision 4 January 2010

### Aims

The purpose of this prospective study was to characterize the clinical profile of patients with atrial fibrillation (AF) in the urban population of a sub-Saharan African country and to assess how successfully current guidelines are applied in that context.

### Methods and results

This prospective study involved 10 cardiologists in Cameroon. Enrolment started on 1 June 2006 and ended on 30 June 2007. Consecutive patients were included if they were >18 years and AF was documented on an ECG during the index office visit. In this survey, 172 patients were enrolled (75 males and 97 females; mean age  $65.8 \pm 13$  years). The prevalence of paroxysmal, persistent, and permanent AF was 22.7, 21.5, and 55.8%, respectively. Underlying cardiac disorders, present in 156/172 patients (90.7%), included hypertensive heart disease (47.7%), valvular heart disease (25.6%), dilated cardiomyopathy (15.7%), and coronary artery disease (6%). A rate-control strategy was chosen in 83.7% of patients (144 of 172) and drugs most commonly used were digoxin and amiodarone. The mean CHADS<sub>2</sub> score was  $1.9 \pm 1.1$  and 158 of 172 patients (91.9%) had a CHADS<sub>2</sub> score  $\geq 1$ . Among patients with an indication for oral anticoagulation (OAC), only 34.2% (54 of 158) actually received it. During a follow-up of  $318 \pm 124$  days, 26 of 88 patients died (29.5%), essentially from a cardiovascular cause (15 of 26). Ten patients (16.1%) had a non-lethal embolic stroke and 23 (26.1%) had symptoms of severe congestive heart failure.

### Conclusion

Clinical presentation of AF in Cameroon is much more severe than in developed countries. A rate-control strategy is predominant in Cameroon and OAC is prescribed in only 34.2% of eligible patients, despite a high CHADS<sub>2</sub> score at inclusion. Death and stroke rate at 1 year are very high in Cameroon possibly because of a lower use of OAC, and a higher prevalence of rheumatic mitral disease and of more severe co-morbidities.

### Keywords

Atrial fibrillation • Africa • Adherence to guidelines • Cameroon

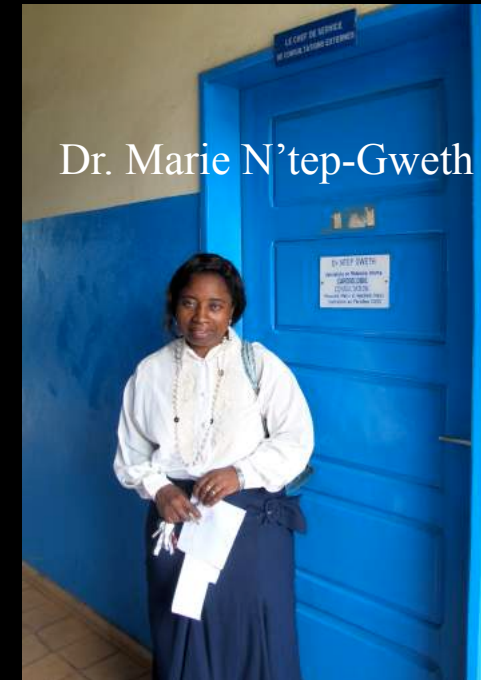
### Introduction

In industrialized countries, atrial fibrillation (AF) is the most common sustained cardiac arrhythmia, strongly associated with an increased morbidity and mortality. Atrial fibrillation causes a five-fold rise in the risk of stroke and one of every six strokes occurs in a patient with AF. Atrial fibrillation is also associated with heart failure, with frequent physician's or emergency department visits and with hospitalization, and with significant economic consequences.<sup>1</sup> In the last decade, important acquisitions in the

management of AF have emerged concerning treatment strategies, risk assessment or stroke prevention, and 'unified' guidelines (ACC/AHA/ESC) for AF management have been published.<sup>2</sup> Even in developed countries, suboptimal anticoagulation is frequently observed<sup>3–7</sup> and a high level of adherence to the guidelines has been shown only rarely.<sup>8</sup> Only very few data are available concerning AF or AF-related stroke in Africa<sup>9–13</sup> and little is known of the clinical characteristics, treatment, and prognosis of African patients with AF. Since the overall burden of cardiovascular disease is predicted to rise by ~150% in the developing

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Dr. Marie N'tep-Gweth

### *Comment from the reviewer and editor-in-chief of Europace, Prof. A.J. Camm:*

“Despite the limitations of the study follow-up, it is interesting to know specifics of specialized care for AF in Africa. Especially the discussion on typical limiting factors for adequately implementing best practice in Africa is worth while...”

# Developing electrophysiology beyond borders

განვითარება electrophysiology  
პროგრამა საზღვრებს მიღმა

Personal experience at OPEN HEART clinic  
Tbilisi - Georgia



EP study  
RF Ablation

on-site teaching of a  
local cardiologist  
for EP and ablation

ECG teaching to  
cardiologists

Electrophysiology program  
in Tbilisi

on site consultation  
for arrhythmias

consultation and ECG  
interpretation through  
the internet

clinical research  
registries



# how to get started ?

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- Demand must be clearly communicated
- Official authorisation
- Direct contact with the local institution
- Selection of the cardiologist to be trained
- Direct contact with all professionals involved
- Check of the local equipment
- Evaluation of the need

## project to develop electrophysiology and ablation at OPEN HEART clinic - Tbilisi - Georgia

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*Provided by Foundation  
Frédéric et Jean Maurice and by  
Foundation "Cœur de la Tour" :*

- senior electrophysiologist + technician
- EP recording system
- teaching (theory and practice)
- RF generator, irrigation pump
- second-**hand** catheters for EP/ablation
- cables and patches

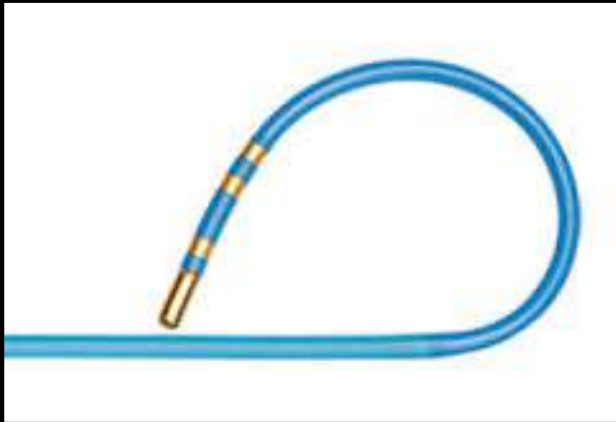
*Provided by OPEN HEART clinic:*

- cathlab with X-ray equipment
- local cardiologist with interest in EP and ablation
- sterilization system (EtO) for cables et catheters
- puncture materials
- patient's selection - data-base

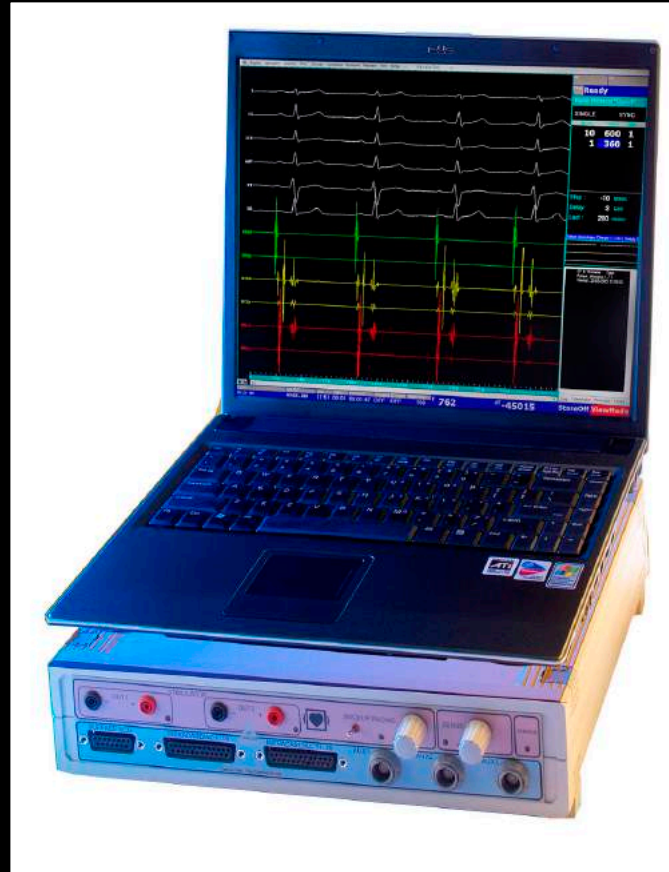
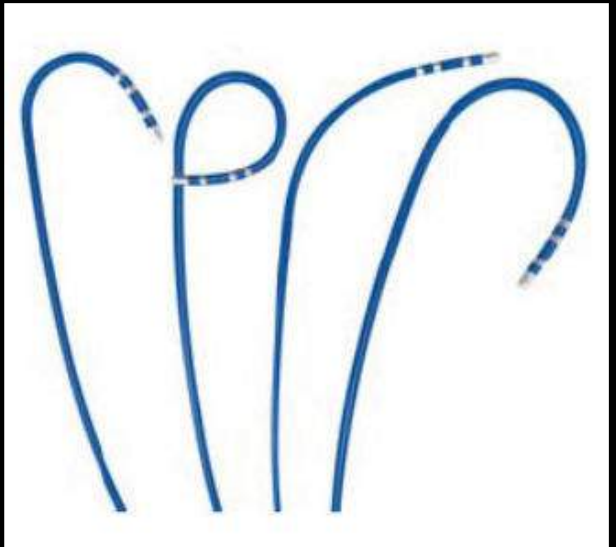
**A true and efficient partnership is based on a  
memorandum of understanding (MOU)**



ablation  
catheters



diagnostic  
catheters



Portable  
EP-tracer  
(Cardiotek)



RF generator  
(Stockert)

## SELECTION of PATIENTS

- regular internet contact (2-3 x/month) for information concerning clinical data, ECG, Holter etc...
- clinical evaluation during on-site visits
- creation of a list of potential candidates for EP / ablation
- during the initial phase, ablation only for AVRT, AVNRT, AT, FL, RVOT (and not for complex arrhythmias like Afib, left atrial flutters or ischemic VT...)

## SELECTION OF THE LOCAL ELECTROPHYSIOLOGIST

- well-trained cardiologist with a high-motivation for electrophysiology and ablation
- fluent in English
- able to perform consultations for rhythmic problems and able to correctly select patients





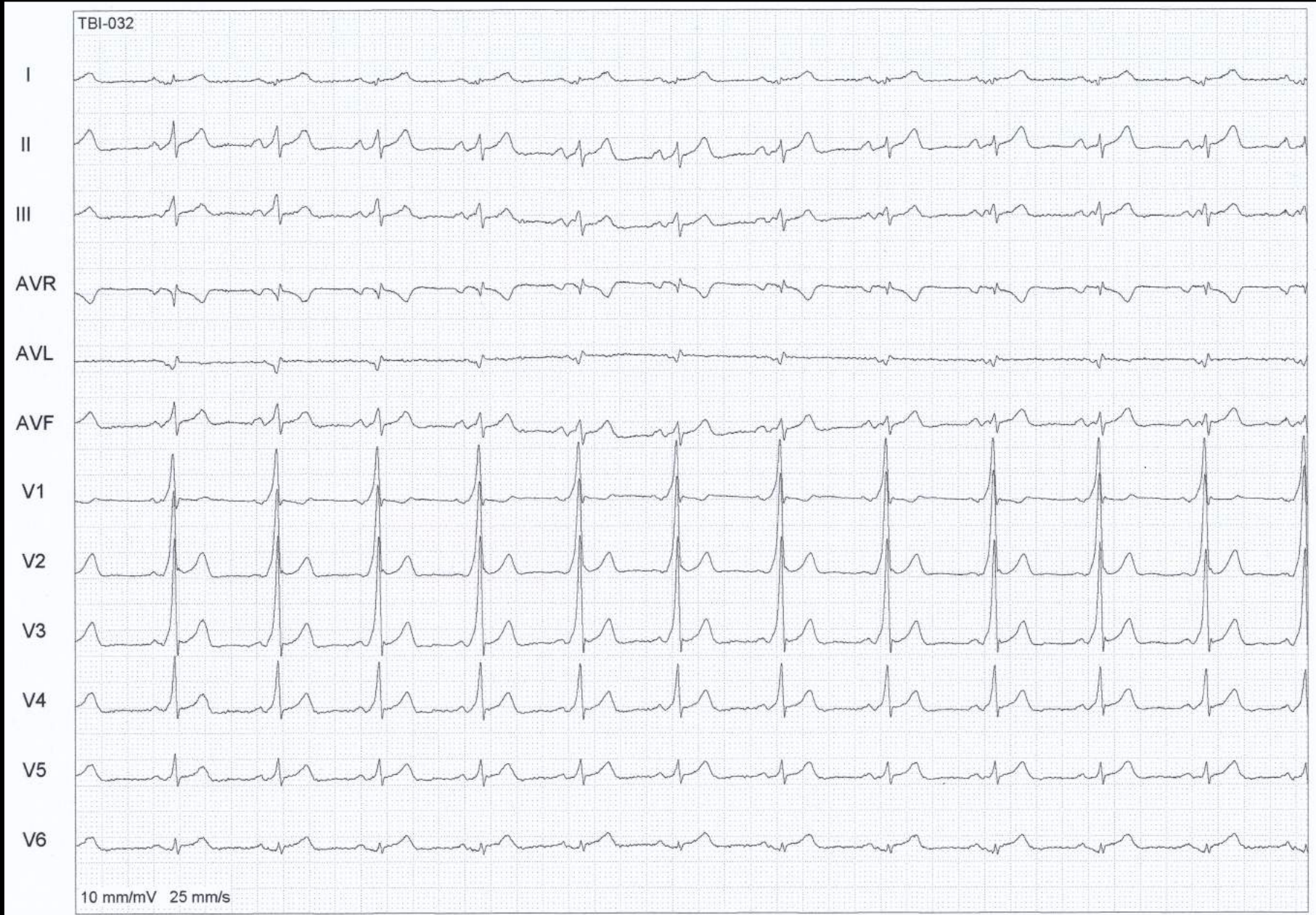
## 12 ablation sessions between Sept 2015 and Feb 2019

date	consultations	EPS-ablations	success	complications
20.09.2015	16	3	2	0
29.11.2015	18	3	3	0
29.02.2016	20	4	4	0
03.07.2016	18	6	5	0
13.11.2016	36	5	5	0
16.03.2017	26	3	3	0
23.06.2017	32	4	4	0
05.11.2017	26	4	4	0
26.02.2018	26	3	3	0
02.07.2018	22	5	5	0
08.11.2018	20	4	4	0
25.02.2019	26	4	4	0
TOTAL	286	48	46	0

\* The 2 failures were successfully treated in a second session







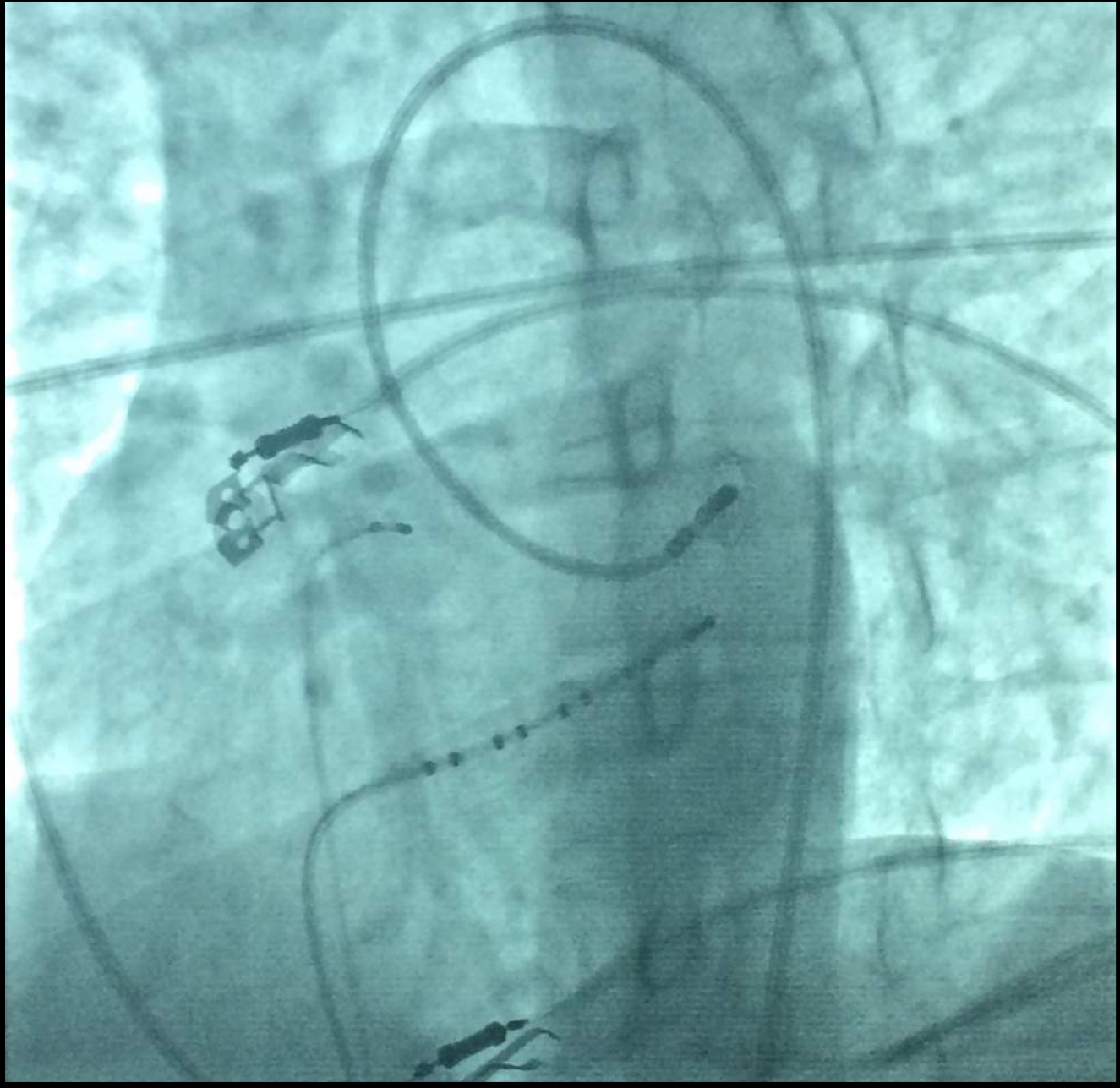
Basal state



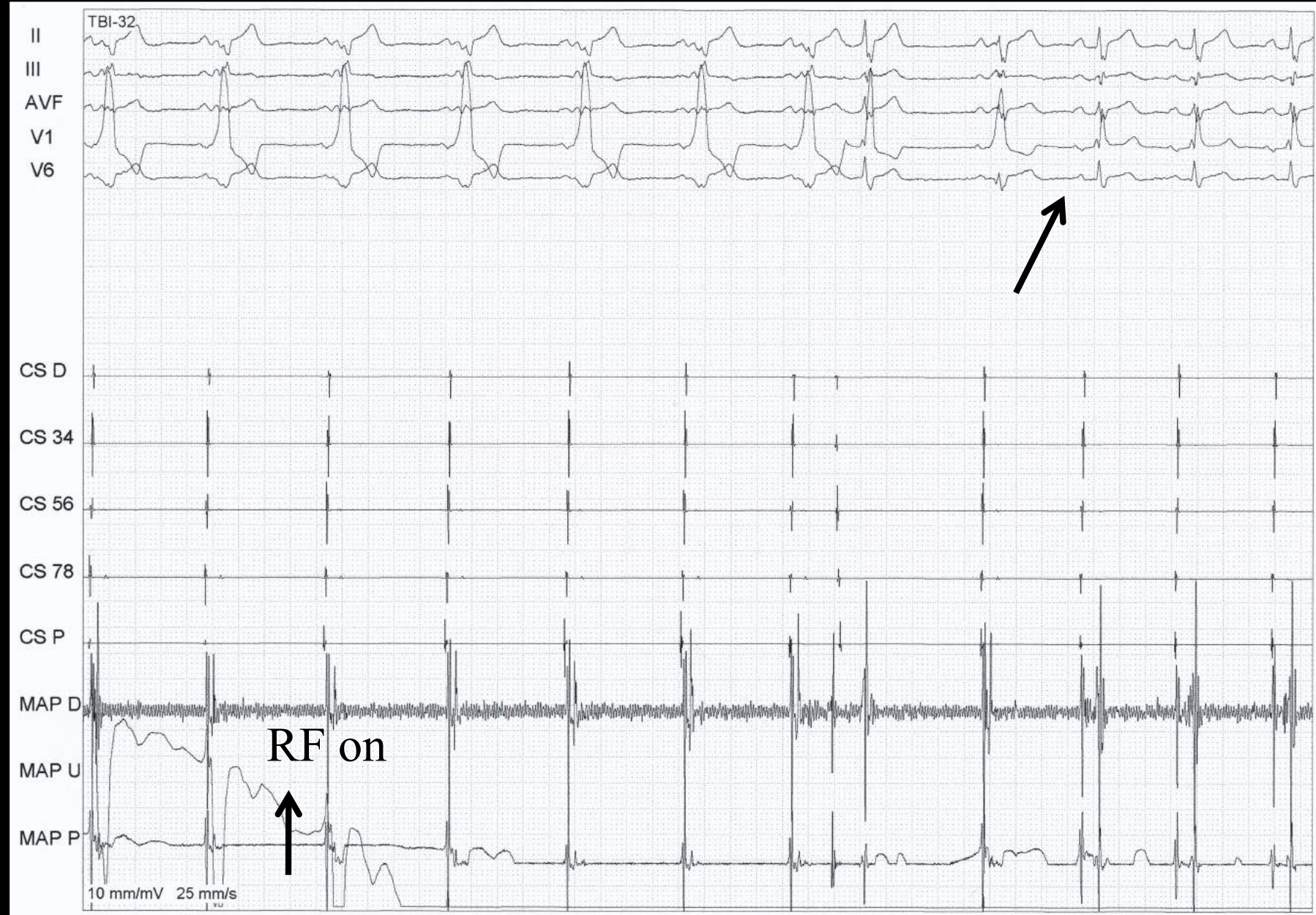
Maximal 1:1 antegrade conduction: 240 bpm



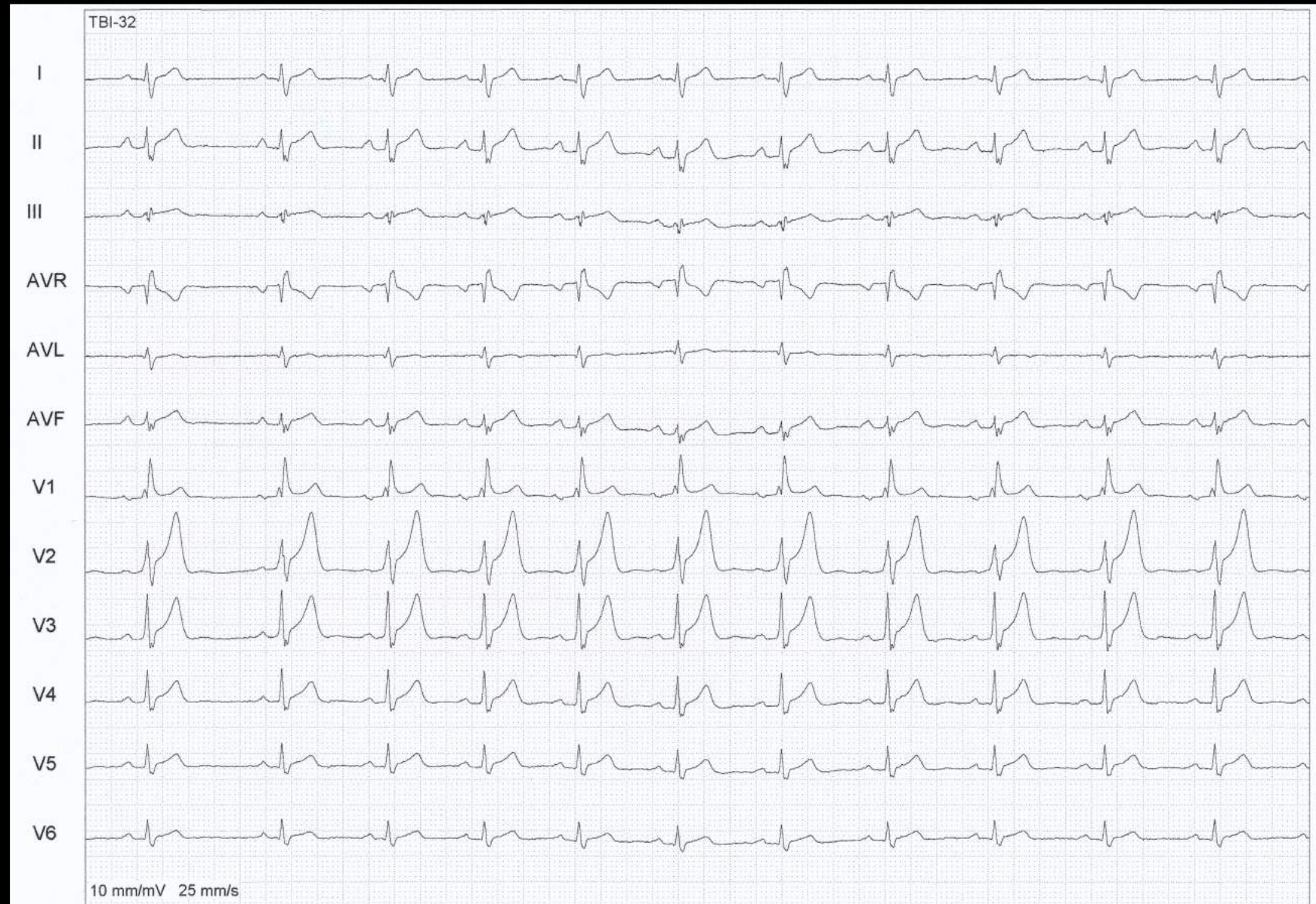
Optimal site







During RF application



End of procedure

**ენდოკარდიული ელექტროფიზიოლოგიური კვლევა და რადიოსიხშირული კათეტერული აბლაცია**

პაციენტი

ხარშილაძე ნიკოლოზ

ნიკოლოზ

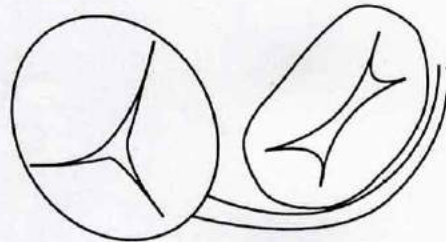
გვარი / Surname

ბიძელი / Name

პროცედურის თარიღი, დრო: 22.09.2015 12:30-14:15

ოპერატორი: Professor Marc Zimmermann / ასისტენტი: გიორგი ცხომელიძე

პაციენტს ზოლო 10 წელია აღენიშნება პაროქსიზმული ტაქიკარდიის ეპიზოდები, ეპიზოდების უმრავლესობა გრძელდება 1-2 საათი. ზოლო ეპიზოდი ჰქონდა აგვისტოში, არითმია კუპირდა ადენოზინით. ზოლო პერიოდში პაროქსიზმული ტაქიკარდიის სიხშირემ და ხანგრძლივობამ იმატა. პროგრესირდა სიმპტომატიკა, რის გამოც მიმართა კარდიოლოგს, სადაც ერთია ენდოკარდიული ელექტროფიზიოლოგიური კვლევა და რადიოსიხშირული კათეტერული აბლაცია.



პაციენტი შეცვანილ იქნა ელექტროფიზიოლოგიურ ლაბორატორიაში, დამუშავდა მარჯვენა ბარძაყის მიდამო. ჩატარდა მარჯვენა ბარძაყის ვენის პუნქცია. ჩაიდგა 6F ზომის ორი და 7F ზომის ერთი ინტროდუსერი. გულში შეცვანილ იქნა 2 ფიქსირებული მოხრილობის დეკაპოლარული და ზიპოლარული დიაგნოსტიკური კათეტერი, რომელთაგან ერთი მოთავსდა მარჯვენა წინაგულში, მეორე კი მარჯვენა პარკუჭში. კორონარულ სინუსში მოთავსდა კორონარული სინუსის კათეტერი. განისაზღვრა ჰისოგრამის ინტერვალები: AH-123msec, HV-45msec. წინაგულიდან პროგრამული სტიმულაციით და იზოპროტერენოლის ინფუზიით გამოწვეული იქნა სუპრვენტრიკულური პაროქსიზმული ტაქიკარდია. VA ინტერვალი 50 მწმ, CL - 330 msec. მარჯვენა პარკუჭიდან ჩატარდა ენტრეინმენტ-მანევრი. VAV

**Response.** ტაქიკარდიის ანალიზი აჩვენებს რომ პაციენტს აქვს წელი-სწრაფი ტიპის ატრიოვენტრიკულური კვანძოვანი რიენტრული ტაქიკარდია.

გადაწყდა წელი გზის აბლაცია. ალიკაციისა მიღებულ იქნა აჩქარებული კვანძოვანი რიტმი. ალიკაციის შემდეგ ჩატარებულმა კვლევამ დაადასტურა წელი გზის წარმატებული აბლაცია. ჩატარებული ელექტროფიზიოლოგიური მანევრებით SVT-ს ინდუცირება შეუძლებელია, მათ შორის იზოპროტერენოლის ადმინისტრაციის შემდეგ. მაგრამ გამოწვეულ იქნა წინაგულთა ფიბრილაცია. გადაწყდა პროცედურის დასრულება, ამოღებულ იქნა კათეტერები და ინტროდუსერები, განხორციელდა ჰემოსტაზი და პუნქციის ადგილას დაედო დამწოლი ნახვევი. პაციენტი გადაყვანილ იქნა ინტენსიური თერაპიის ზღოვში.

**დასკვნა:** წელი-სწრაფი ტიპის ატრიოვენტრიკულური კვანძოვანი რიენტრული ტაქიკარდია. წელი გზის სელექტიური აბლაცია. წინაგულთა ფიბრილაციის პაროქსიზმი (სტიმულაციის შედეგად გამოითარებული).

**რეკომენდაციები:**

1. კორდარონი 200მგ სინუსური რიტმის აღსადგენად;
2. მაპოლარიზებული ხსნარი, წყალ-ელექტროლიტური დისბალანსი კორექცია;
3. კარდიომეგნილი 150 მგ 1 აბი შუადღეს სადილის შემდეგ 6 კვირა.

კარდიოლოგი (ელექტროფიზიოლოგი): \_\_\_\_\_ Professor Marc Zimmermann

understandable  
and readable  
report...

Pacemakers implantation and radiofrequency catheter ablation procedures  
during medical missions in Morocco: an 8 years experience

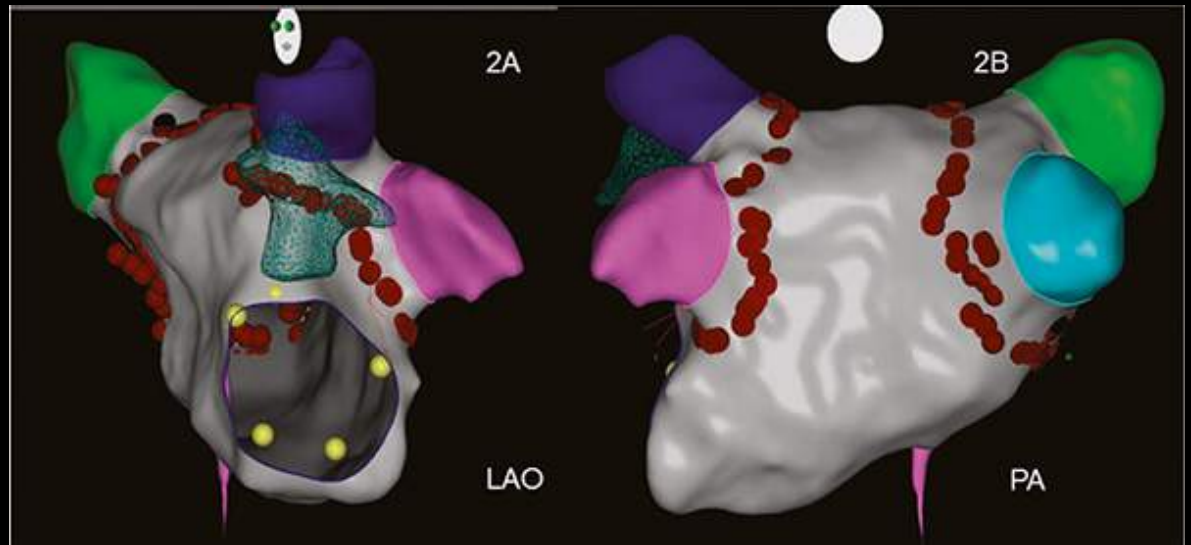
Sok-Sithikun B et al. Europace 2016; 18: 1038-1042

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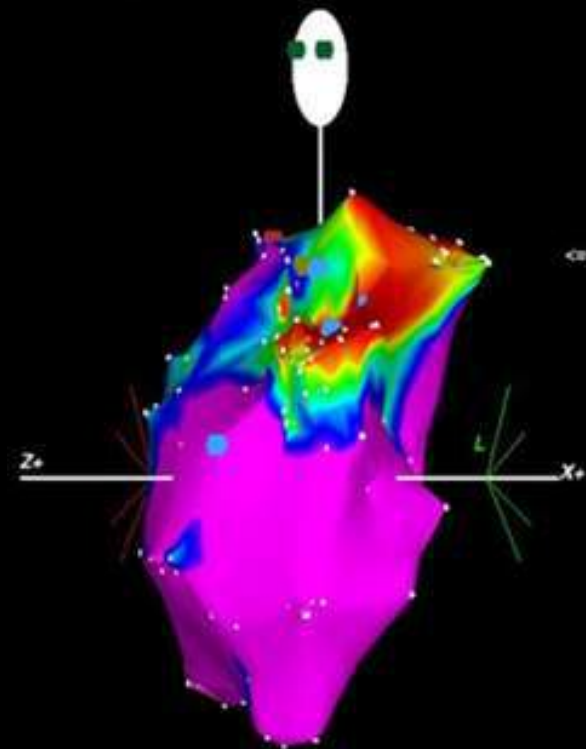
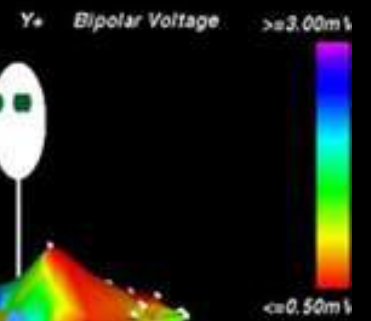
Number of RFCA :	31
Number of medical missions :	11
AVNRT	12
AVRT	15
atrial flutter	3
ventricular ectopy	1
Accute success	29/31
Complication (AV block, air embolism)	2/31

# What about the future ?

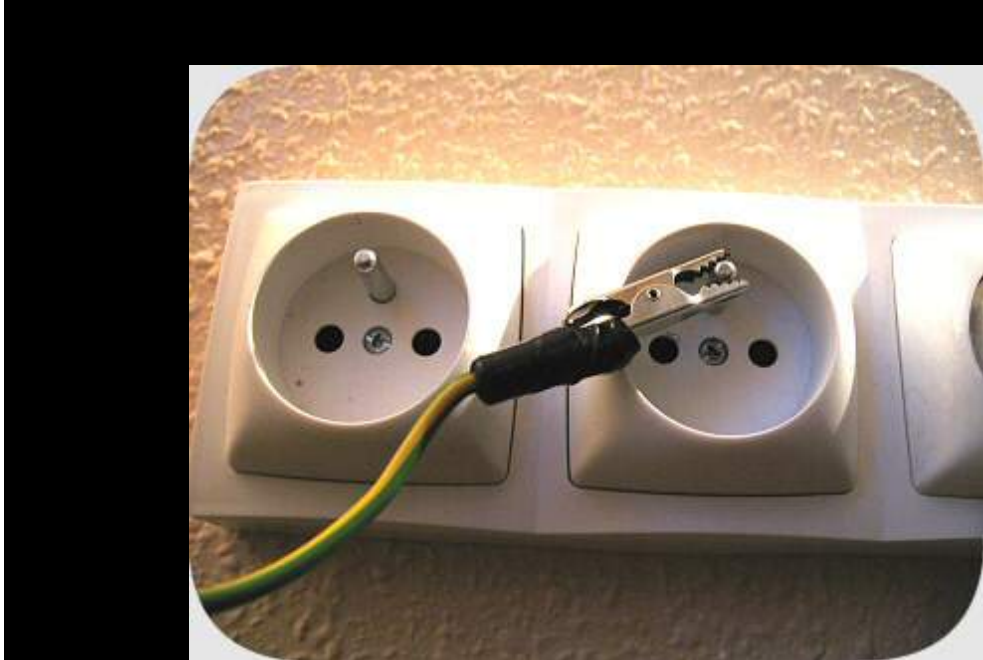
- continuing education and teaching
- full autonomy of the local electrophysiologist
- transfer of knowledge locally (nurses...)
- improving local organisation (arrhythmia clinic)
- improving technology
- extending indication to more complex arrhythmias



Stage: Baseline  
Display: Map 1



Back to the future....



consultation office  
Hôpital Central - Yaoundé



non-functioning cathlab  
Hôpital Général - Yaoundé



# What about the future ?

- Improving collaboration with other centers
- Favours on-site clinical research
- Expand access to EP-ablation to all patients
- Improving policy for reimbursement
- Fighting against corruption

A real problem in many countries ...



# conclusion

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- Developing a program for EP and ablation in less developed countries is **feasible** but not always easy
- The program should be based on **transfer of knowledge** and education at all levels
- The first step should always concentrate on **ECG learning**
- The program should be designed for the **long-term**
- The aim is to offer knowledge, competence and **autonomy**
- Success highly depends on a strong **personal relationship**

This presentation is dedicated to all colleagues who are trying to treat cardiac arrhythmias in a difficult context:

- political instability
- economical restrictions
- scarce domestic funding
- unavailability of technical materials

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