Supraventricular Arrhythmia 3:
Atrial reentry including
typical and atypical flutter, and
incisional tachycardia

Prof. Dr. Hein Heidbuchel
Cardiology - Electrophysiology
University Hospital Gasthuisberg
University of Leuven, Belgium
What do we mean by “flutter”? 1

- Atrial flutter: “>240/min, continuously waving, without an isoelectric baseline in at least one lead”
- Mechanisms can be:
  - focal (automaticity, triggered, microreentry) or macroreentrant (“IART”)
- Some characterized macroreentrant atrial tachycardias:
  - Typical flutter: i.e. peritricuspid, counterclockwise
  - Reverse typical flutter i.e. peritricuspid, clockwise
  - Lower loop flutter; Double wave reentry, …
  - Incisional reentry / peri-atriotomy IART
  - Left atrial macroreentrant tachycardia
- Note: term “atypical flutter” is only a descriptive term:
  - >240/min, continuous undulation, ECG ≠ typical or reverse typical

“Isthmus-dependent” atrial Flutter

Ablation is highly effective:  
- acute success rate: 85.8%\(^1\) - 99%\(^4\)  
- recurrence rate: 14.7%\(^1\) - 4.4%\(^4\)

Activation mapping & concealed entrainment

[Graph showing electrocardiogram tracings labeled with various sites such as RAA, Halo8, Halo7, etc. with intervals labeled at 220, 250, and 240 ms.]
Verification of isthmus conduction by pacing at either side: bi-directional block?
(Angiographic) isthmus evaluation
e.g. aneurysmal aspect

Block with RF5, inside pouch (4 mm tip, asymmetric #4 EPT)

Heidbuchel et al., Circulation 2000
“Sweeping Halo”- technique
Rapid recognition of “areas of interest”

Anné & Heidbüchel, Eur Heart J 2002

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Early ablation of flutter > less AF?

103 pts with atrial flutter: RF vs. amio as first line

Da Costa et al, Circ 2006

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Double Loop Arrhythmias

Figure-8 around atriotomy and tricuspid annulus
Validation of bi-directional block
Essential; across all ablated isthmi

Anné & Heidbüchel, Eur Heart J 2002
Types of atrial tachycardia
3 steps to differentiate

Three Deductive Steps

STEP 1 CL Irregularity
→ > 15%
  
→ No
   ↓
  
STEP 2 Diagnose or exclude macroreentry

Activation and PPI compatible with
Purkinje
Root dependant
Pulmonary

Yes
↓
Linear ablation

No
↓
STEP 3 Locate focal arrhythmia

Activation and PPI
Focal ablation

Jaïs et al, J Cardiovasc Electrophysiol 2009
Types of atrial tachycardia

Circuit involving ≥ 3 segments
>75% of CL recorded in circuit
Good PPI in 2 opposite segments
PPI increases further from focus
Jaïs et al, J Cardiovasc Electrophysiol 2009

Centrifugal activation
>75% of CL recorded locally
Good PPI in only 1 segment
PPI increases further from focus

Centrifugal activation
<75% of CL recorded
Good PPI in only 1 segment
PPI increases further from focus

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Electro-Anatomic Mapping
Voltage Mapping of All Channels

Patient with Tetralogy of Fallot  
Nakagawa & Jackman, Circulation 2001
Technical Approaches

• Classical EP will often suffice
  – cf. predilection sites
  – rapid activation mapping by “sweeping halo”
  – confirmation by entrainment pacing
  – evaluation of bidirectional target-line block post-ablation

• 3D merging

• Electro-anatomical or non-contact mapping:
  – may be more time-consuming
    • point-by-point mapping; multiple arrhythmias with conversion
  – more expensive
  – indicated in cases with widespread scarring or unconventional circuits
    • Fontan, Mustard or Senning, left atrial circuits

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Conclusion: atrial reentry

• Ablation of atrial tachycardia makes sense
  – most of the time
    • as principle: “all regular AT can be ablated”
  – definitely for typical flutter,
  – and for common intra-atrial reentrant mechanisms

• But not in all
  – if diffusely fibrosed atria (Fontan, dilated LA)
    • palliation, no cure
  – if dominant presentation with AF
  – if associated bradycardia
⇒ (association with) other approaches
  • drugs
  • (antitachy)pacing
  • rarely His bundle ablation
  • PVI